AVIATION WEEK
NOV. 9, 1953
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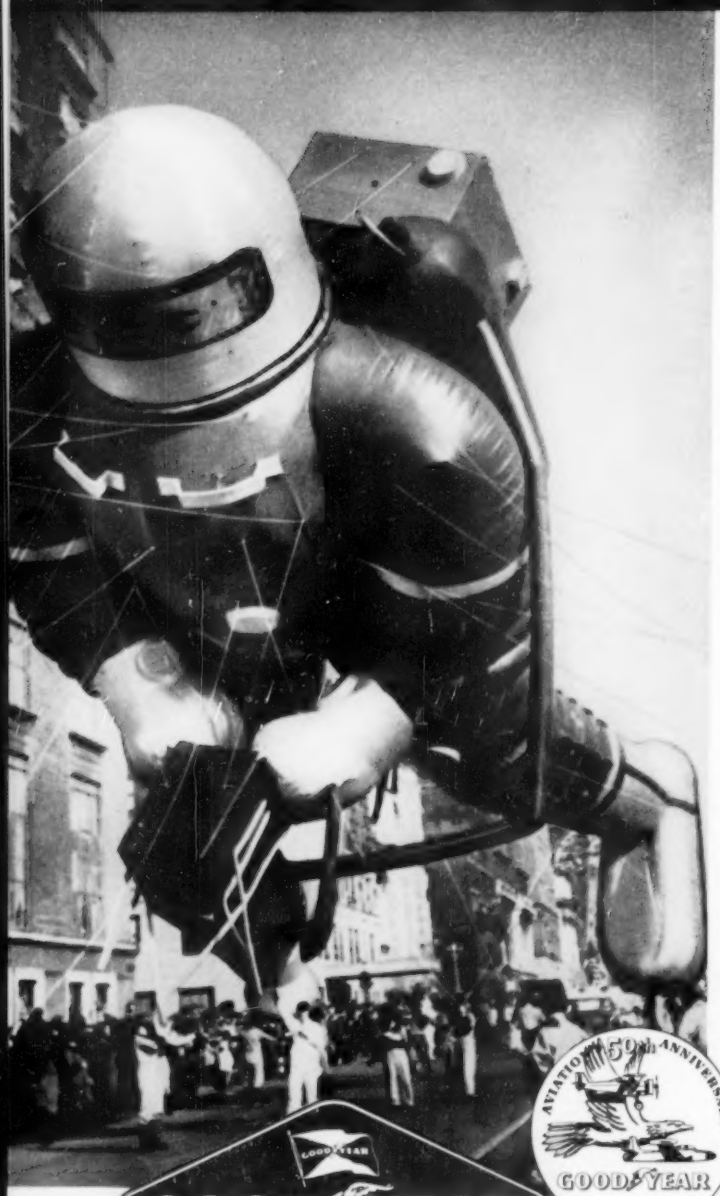

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THIS giant "Space Man" will be a feature of this year's Macy Thanksgiving Day Parade in New York City — just as other Goodyear-built figure balloons have highlighted this annual event for 22 years.

These wondrous characters, made of inflated rubberized fabric, owe their existence to Goodyear aeronautics pioneering which goes back to early racing balloons, the famed "Stay Tight" Fabric used on the wings of early Wright biplanes and the first successful bullet-sealing fuel tank.

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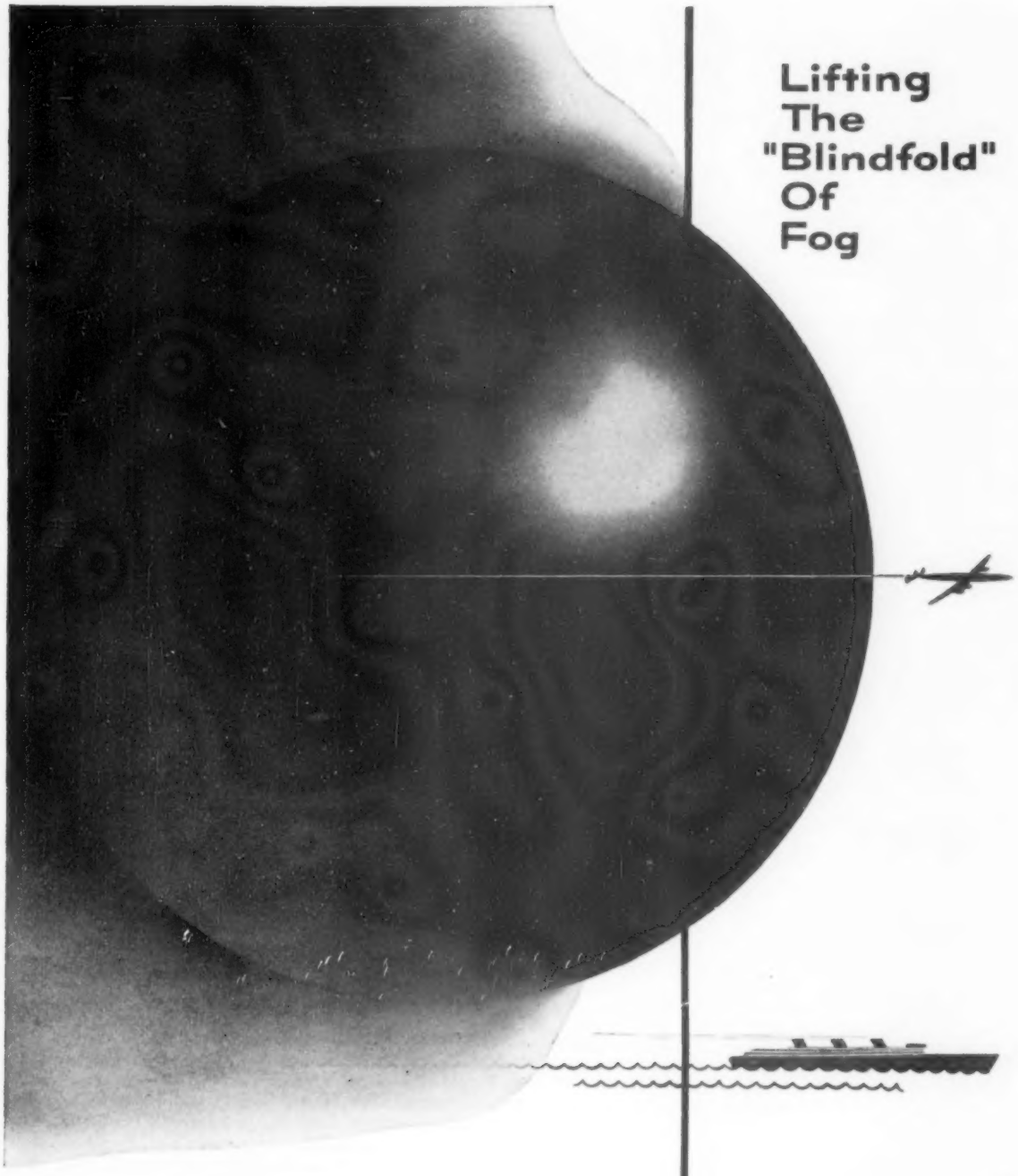

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Aviation Week

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developed by AiResearch lab to measure air flow through turbo-machinery

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NEWS DIGEST

Domestic

Preliminary investigation in the crash of a British Commonwealth Pacific Airlines DC-6 10 mi. south of San Francisco International Airport indicates the pilot believed he had cleared coastal mountain ridges while on an instrument landing approach to the field. All 19 persons aboard the transport were killed when it clipped 2,400-ft. King's Mountain Oct. 29, plunged into a dense woods and burned.

Radically new type of rate gyroscope, whose extreme sensitivity makes it attractive for use in missiles and aircraft guidance and fire control systems, is being unveiled this week by Sperry Gyroscope Co. and Navy's Bureau of Aeronautics. New gyro uses vibrating mass instead of conventional rotating mass. At a conference of military and industry gyro experts, Navy disclosed that Sperry is flight testing an experimental autopilot that uses these new "vibrogyros."

Eastern Air Lines has awarded contracts to Cities Service Oil Co. for 74-million gallons of aviation gasoline, making the second large fuel supply set up by EAL for 1954. The carrier recently signed a $35-million contract with Shell Oil (AVIATION WEEK Oct. 19, p. 17).

Lightplane producers exported 71 aircraft valued at $577,022 during September, bringing overseas shipments so far this year to 444 units at $3,248,360, according to Aircraft Industries Assn. Companies reporting: Beech, Cessna, Piper and Taylorcraft.

New T-10 troop parachute will be procured by the Air Force and Navy under a free license granted by Switlik Parachute Co., Trenton, N. J.

Harold B. Thomas, a founder of Elastic Stop Nut Corporation of America and president of Control Products, Inc., died Oct. 23 at Short Hills, N. J.

Thomas S. Blair, 55, manager of the Aviation Sales Division of Cities Service petroleum, was killed last month in a plane crash at Bunnell, Fla.

Financial

Trans World Airlines reports net earnings of $5,722,586 for the first three quarters of 1953, a $610,006 drop from the same period last year. Total operating revenues climbed to a record $142,243,418, compared with $117,713,550 in 1952. TWA says lower earnings resulted in part from a $4,759,000 increase which was made in allowable depreciation.

Super Constellations on the Line

Nineteen military Super Constellations of various models are seen assembled in a section of Lockheed Aircraft Corp.'s installation at Burbank, Calif., pointing up that production of the craft is at an all-time peak. Some of the Super Connies shown: USAF RC-121C radar pickets and Navy R7V-1 cargo-passenger transports. Three USAF Boeing C-97 Stratofreighters also are visible on the LAS flight line.

Glenn L. Martin Co., Baltimore, more than doubled its net profit during the first nine months of this year, climbing from a 1952 nine-month net of $2,756,764 to $7,365,843 for 1953. Sales were $45,921,459, compared with $35,529,229 last year.

Bell Aircraft Corp., Buffalo, N. Y., reports a net profit of $2,647,832 for the nine months ended Sept. 26, a 64% increase over the same period last year. Sales totaled $103,728,433, climbing 20% from $86,422,420 in 1952. Backlog: approximately $463 million.

McDonnell Aircraft Corp., St. Louis, increased net earnings to $1,102,749 during the first quarter of fiscal 1954 from $904,262 for the same period last year, according to unaudited interim reports. First quarter sales were $36,639,661, compared with $24,940,377 in fiscal 1953. Backlog Sept. 30: $46,236,641.

United Air Lines has declared an extra dividend of 50 cents per share on common stock in addition to a regular quarterly payment of 25 cents. UAL also has declared a $1.125 dividend on 4½% cumulative preferred stock. Both dividends are scheduled payable Dec. 15 to stockholders of record Nov. 13.

Beech Aircraft Corp., Wichita, is holding up its regular 25-cent quarterly dividend on common stock because of government delay in paying "large amounts" due in final settlement of Beechcraft's canceled T-36 contract. But the company says some adjustments will be attempted in future dividends.

Delta C&S Air Lines will pay a 30-cent dividend Dec. 1 to stockholders of record Nov. 13.

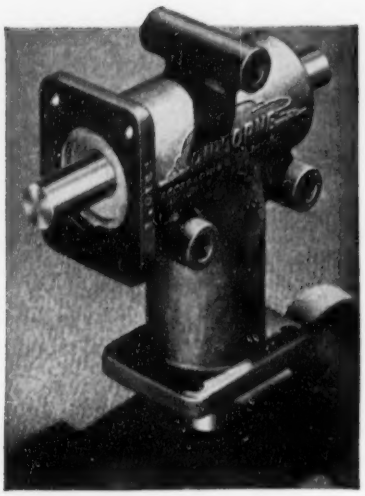
International

Objections by the U.S. Civil Aeronautics Board forced government-owned Trans-Canada Air Lines to cancel last week's inaugural flight of its new Montreal-Mexico City service via Tampa, Fla. CAB's decision touched off reviews by the Ministry of Transport of agreements covering U.S. air carrier operations in Canada.

Overall strength of Sweden's air force is estimated by sources in Stockholm at 1,500 first-line aircraft, fourth largest in the world. Saab 29 swept-wing jets make up the greatest part of the fighter force, according to reports.

Lord Kenilworth, 87, former chairman of Armstrong Siddeley Motors and onetime president of the Society of British Aircraft Constructors, died Nov. 3.

Right angle
TRANSMISSION
PROBLEM
?



Before spending time and money on a tailor-made design, investigate ANGLgear. You'll learn why these tiny right-angle bevel gear drives are so widely used. ANGLgears have the capacity of units many times their size. Model R-300 is rated at ⅓ hp at 1800 rpm—Model R-320 at 1 hp. Both models have hardened gears and ball bearings, are lubricated for life. Both are made with 1:1 ratio, and with 2-way or 3-way shaft extensions.

ANGLgears are described fully in the I. A. S. Aeronautical Engineering Catalog. Refer to this publication for complete information, or write us direct.

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November 9, 1953

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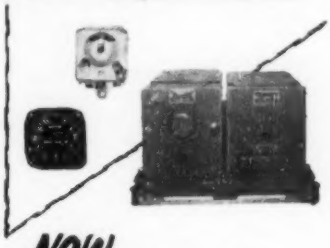

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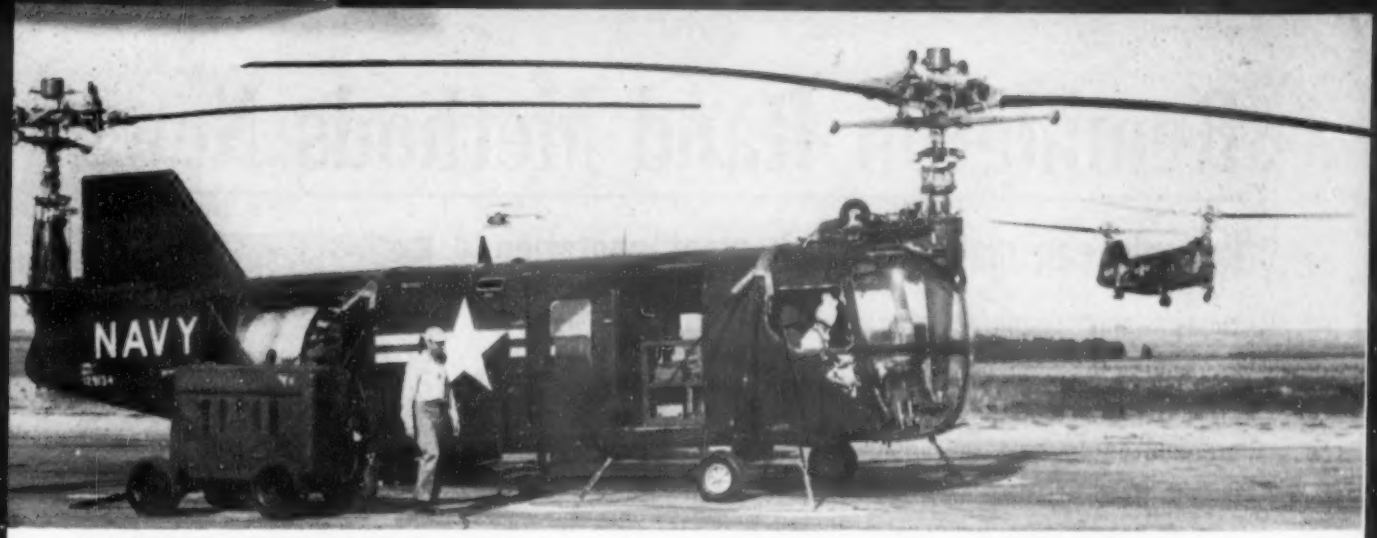
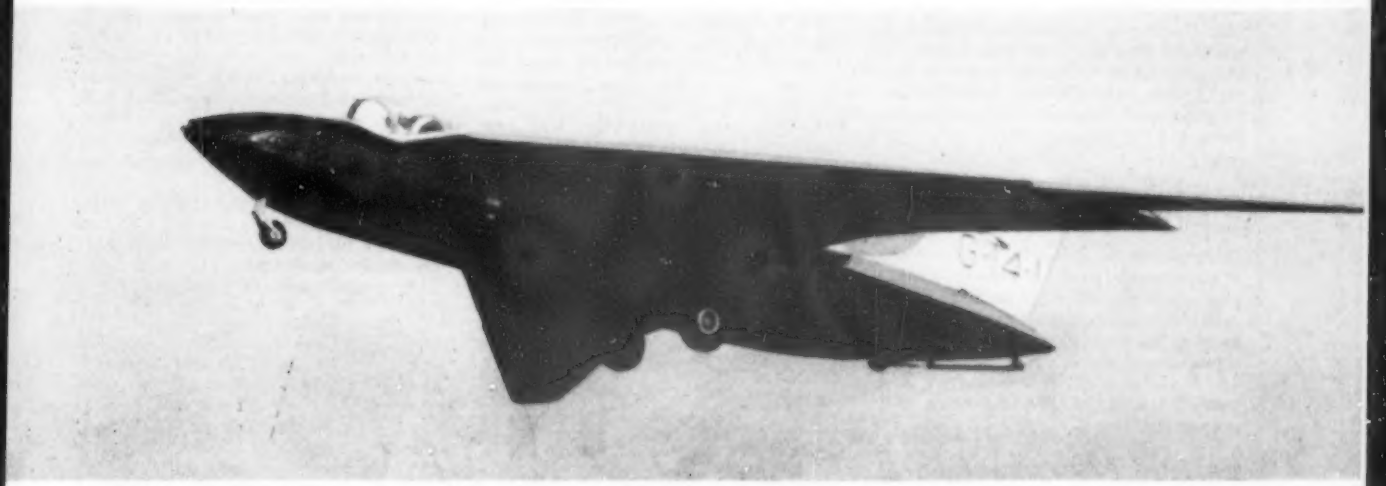


SECOND XHSL-1 BEGINS TESTS—Bell Aircraft Corp.'s second prototype XHSL-1 (foreground) undergoes tie-down ground tests, while first prototype of the anti-sub copter (right) accumulates flight time. HSL production is under way at Ft. Worth, Tex.

New U. S., Foreign Aircraft Start Tests



SHERPA'S FIRST FLIGHT—Jet-powered Short Sherpa research plane, which has aero-isoclinic swept wings is seen on its initial flight (above). Plane's all-moving wingtips act as elevators and ailerons, replacing conventional horizontal tail surfaces.

BRAZILIAN TRANSPORT MAKES DEBUT—Closeup views (below) show details of new five-place all-metal Casmuniz 52, designed and built by Cassio Muniz S.A., Sao Paulo, Brazil. Plane is powered by two 185-hp. Continentals and cruises at over 165 mph.

Remington Rand Methods News

Records can make or break plant operation!

Today's alert manufacturing executive needs the right, simplified record-keeping procedures to help increase output from existing facilities . . . at lower cost per unit!

The highly competitive market that exists today makes it vital for plant executives to be on the look-out for new ways to cut back overhead and step up output per machine. All too often, efficient record-keeping methods are overlooked in the search for more efficient manufacturing equipment. However, we think you will find that the right record-keeping methods, used in the right place, can offer you dramatic new savings and stepped up production. Here are the reasons why.

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Communication through the proper use of paperwork is vital to smooth, profitable plant operation. If records do not provide management with the right facts at the right time so that they may check on and control work flow through all departments, a tremendous and wasteful outlay of time and money and energy can result.

Effective Production Control starts in the Engineering Department

It is in Engineering that Production Control starts. Engineers must understand "how" and "why" manufacturing depends on practical production control techniques. If not, trouble in back ordering, in idle time, shortages, "over expediting" and slow deliveries result.

For the "tough ones" our practical-minded Management Consulting Staff can be called in. These experienced men can uncover trouble spots. They can integrate engineering objectives with production practices by tailor-making the right control methods. They can recommend comprehensive data files for providing fast reference to engineering facts. They can supply specialized equipment for efficiently housing and protecting vital engineering drawings and data. And they can recommend the right types of modern, efficient photocopying equipment for engineering department use.

Materials Management Systems don't cost— they pay!

In Material Management you must do more than look at "maximum" and "minimum" figures. Such facts as lead time, value, requirements, availability and economical order quantities must be considered. And here's where your Remington Rand man re-enters the picture. For example, he can recommend an efficient system to develop *precise* material requirements for production scheduling. This is accomplished mechanically and at high speed with punched cards, or with manual methods, depending on the size of your plant's operations. The Remington Rand man may also recommend our Commodity Classification Service. This service: establishes identification by proper nomenclature and numbering; classifies parts, assemblies and raw materials; establishes parts lists, catalogues and data files; establishes interchangeability; etc.

High-speed tabulating equipment at Rotary Lift Co. automatically gives executives fast and accurate Production Control facts in a fraction of the time previously required.

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WHO'S WHERE

In the Front Office

Dr. Charles G. Sage, former rocket research specialist for General Electric Co., is new president of Arde Associates, Newark, N. J.

Dr. L. T. E. Thompson has been appointed executive vice president of Norden Laboratories Corp., Milford, Conn. Other changes: **M. L. Voight**, controller; **William W. Sisbower**, assistant treasurer; and **M. V. Lane**, administrative assistant for the Research and Development Division, White Plains, N. Y.

Kay McMurray is new executive vice president of the Air Line Pilots Assn., Chicago.

William E. Zisch has been named vice president of Aerojet-General Corp., subsidiary of General Tire & Rubber Co., Akron.

Harold E. Cooper has been promoted to vice president in charge of sales and customer relations for Angelus Aircraft, Los Angeles.

Robert F. Windfohr, Ft. Worth, Tex., oilman, has been elected to the board of Consolidated Vultee Aircraft Corp., San Diego. **T. F. McAleer III** has become chief of manufacturing control for Plant I of Convair's San Diego Division.

Changes

Arthur W. Cruse is new general manager of Lear's Aircraft Service Division, Santa Monica, Calif.

J. A. Frabutt, specialist in aircraft navigational and communications systems, has been appointed general sales manager of Federal Telephone & Radio Co., Clifton, N. J., a division of International Telephone & Telegraph Corp.

N. E. Halaby resigned last week as deputy assistant to the Secretary of Defense to join Laurance Rockefeller Enterprises, New York, as an aviation and avionics specialist in new product planning, research and development.

Rear Adm. William T. Rassieur (USN Ret.) is new military requirements representative for Lockheed Aircraft Corp., Burbank, Calif.

Jack Shea has resigned as public relations manager of McDonnell Aircraft Corp., St. Louis, and is joining Aro, Inc., Tullahoma, Tenn., as special assistant to the managing director.

Charles D. Thomas has been promoted to chief engineer of General Riveters, taking over development of the Buffalo, N. Y., firm's new high-speed riveting and automatic assembly equipment for aircraft production.

Honors and Elections

Frederick B. Rentschler, chairman of United Aircraft Corp., East Hartford, Conn., will receive a special gold medal from Gov. John Lodge for his contributions to aviation.

INDUSTRY OBSERVER

► Westinghouse Air Arm Division at Baltimore has developed a lightweight radar for day fighters as a private venture it eventually hopes to sell to USAF and Navy. This radar would locate enemy aircraft at ranges far beyond the limitations of the human eye in the uniformly blue sky above 35,000 ft. Sabre pilots battling MiG-15s in Korea reported the need for such a device as a supplement to their own vision in spotting enemy formations at sufficient distance to maneuver into the best attacking position.

► Boeing Airplane Co. has completed successful preliminary tests on a reverse-thrust device for turbojet engines and is proceeding with advanced development of the principles involved. Boeing plans application to both its jet transports and jet bombers when the reverse-thrust device is sufficiently developed.

► First production of Navy Douglas A3D (AVIATION WEEK Nov. 2, p. 7) now flying at Edwards AFB is powered by two Pratt & Whitney J57 turbojets, replacing the Westinghouse J40s which were employed on the prototype.

► Navy is equipping all of its coming generation of carrier and water-based fighters with all-weather capabilities. The McDonnell F3H, Douglas F4D and Convair F2Y will carry nose-packaged radar intercept and fire control equipment.

► Sikorsky Division of United Aircraft Corp. plans to double its present production capacity with a new 600,000-sq. ft. plant at Stratford, Conn. Plant eventually will boost Sikorsky employment by about 3,000 and will be used initially for production of the HR2S twin-engine Marine assault helicopter. Plant will cost $17,500,000.

► North American is developing an all-weather version of the F-100 as a model modification similar to the F-86D development from the basic F-86 design. Second prototype F-100 is now flying at Edwards AFB. Company also is trying to interest Navy in buying some blue-painted F-100s for aircraft carrier use.

► Douglas Aircraft is considering shifting its production flight test activities from the Los Angeles area to Minter Field, near Bakersfield, Calif. Navy and Douglas are planning to extend runways at the former World War II basic flight training school from 4,500 ft. to 10,000 ft.

► Convair's turboprop-powered Model 340s now have been officially designated C-131C by USAF. Original C-131C was a piston engine version of the Model 340, equipped with special cargo equipment and scheduled for use as a support transport for USAF combat units. Allison T56 turboprops are being installed in the first of the two C-131Cs at Convair's Ft. Worth Division.

► Sikorsky is about to begin tie-down tests on its big HR2S twin-engine Marine assault helicopter. First flight is scheduled before the end of November.

► Latest British all-weather fighters will be supplied with American-designed and -produced radar intercept and fire control equipment under the foreign military assistance program because no suitable British equipment is available.

► Four squadrons of Northrop F-89 Scorpion all-weather fighters are back in service, USAF reports, following extensive modifications to strengthen the plane's wings. Three Scorpion units are based in the U. S. and the fourth near Anchorage, Alaska.

► Republic Aviation Corp.'s production of F-84F Thunderstreak airframes still is outrunning deliveries of the plane's Wright J65 Sapphire turbojet, but indications are that J65 deliveries will accelerate in the near future. Conversion of the J65 from aluminum to steel compressor blades is still the major engine problem.

Washington Roundup

Contract Policy

Despite announced intentions of USAF and Navy to avoid use of letters of intent in making future orders for aircraft, industry sources report first orders received from fiscal 1954 funds are in the form of letters of intent rather than firm contracts. Industry is doubtful USAF and Navy can make good on promises to issue only firm contracts without imposing serious lags in lead time.

Industry attitude is that letters of intent are not a serious problem, if converted to firm contracts within 90 days. Big gripe has been that military services have taken as long as two years to convert them to firm contracts.

Progress Payments

Aircraft industry still is watching for the first concrete indication of how Defense Department actually will administer its new policy on restricting progress payments to military contractors. Defense refuses to amplify its original policy statement, but reassures industry it has no cause for alarm.

Another Super Carrier

Navy asks funds to begin construction of a fourth super carrier of the Forrestal class in its fiscal 1955 budget.

X-3 Release Stymied

Proposed USAF release of flight photographs of the Douglas X-3 research aircraft has been stymied at Defense Department level.

B-36 Interception Reports

Pentagon insiders are wondering how Adm. K. Arthur W. Radford, chairman of the Joint Chiefs of Staff, and other top Navy brass who led the fight against the USAF B-36 program, are explaining reports on Strategic Air Command B-36 missions that show current jet fighter types still are having a hard time making proper interceptions of the giant bomber at altitudes over 45,000 ft.

Both Navy Banshees and USAF F-86s have been pitted against B-36 formations without much success within the radar range and altitude of the big bombers.

C-46 Squeeze

Watch for Air Transport Assn. to try to generate congressional heat on nonscheduled airlines' use of the C-46 for passenger transport, particularly troops. Nonskeds now operate C-46s for passenger-hauling on special CAB waiver, while the Board bars scheduled airlines from using this plane in passenger service. Recent series of C-46 crashes bolsters ATA case before Congress.

Weapons System Problem

Although USAF is reconsidering its policy of awarding a single prime contractor the management responsibility for developing a complete weapons system, Navy now is studying various methods by which it could delegate more development responsibility to contractors.

Both services are faced with an acute shortage of technically qualified personnel to ride herd on the many facets of developing a complete modern weapons system and picking adequate production facilities for its components.

Railroad Lobby

There are signs the railroad lobby is girding for another big effort at the next session of Congress aimed at reducing federal aid to airlines, both directly in subsidy payments and indirectly in federal services such as the airways now furnished without charge.

User Charges

Prospects for an increase in the federal aviation gas tax as a method of collecting federal airways user charges are dim. CAA proposal to raise $21.2 million by any method would hit all non-subsidized airlines hard. User charge levy would change slim airfreight profits into loss.

Helicopter Stalemate

Civil Aeronautics Board is not about to consider any of the more than 47 new applications for subsidized local transport helicopter services. These applications face a long dust-gathering period at CAB while the experimental services already operating at Los Angeles, Chicago and New York accumulate operational experience.

Allegheny Airlines, whose present route is considered most adaptable to local service helicopter operations, predicts that "at least five years and possibly as many as eight to 12 years must elapse" before helicopters may be considered as a replacement for fixed-wing aircraft.

Colonial Merger

The Eastern-Colonial Airlines merger case still is in the hands of the White House staff. Indications are that President Eisenhower has not yet seen the CAB recommendation. National Airlines still has hopes of winning the White House nod over Eastern.

Washington Puzzle

Washington observers are wondering what the real story is behind the sudden cancelation last week of a White House appointment for Lord Hives, head of the British Rolls-Royce Ltd., to see President Eisenhower. Rolls-Royce currently has a technical assistance agreement with Westinghouse Electric Corp. on jet engines and there have been persistent Washington reports that Rolls is pushing for Westinghouse manufacture of its Avon R.A. 14 turbojet for the Navy.

Flanders Investigation

Aircraft industry is interested in the current investigation of military budgetary policies and practices being conducted by a subcommittee of the Senate Armed Services Committee headed by Senator Ralph Flanders. Many of the industry's financial problems are the direct result of the military policies required by law or military practices that have developed because of the inflexibility of procurement regulations that don't fit modern business practices.

—Washington staff

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FBI, Senate Committee Investigate CAB

- **Rep. Rivers' attacks on influence of 'monster airlines' touch off probe; handling of Balboa case is scored.**
- **Report to White House could lead to reorganization; McCarthy eyes developments, may act independently.**

The Federal Bureau of Investigation and the Senate Permanent Investigating Committee are making independent investigations to determine if irregularities have been involved in the activities of Civil Aeronautics Board.

Individuals interrogated by the investigators report they have been questioned extensively for information on CAB chairman Oswald Ryan.

A Republican, Ryan was designated chairman by President Truman in the late days of the outgoing Administration and was continued in the post by President Eisenhower. He has served longer than any present Board member, receiving his appointment at the inception of CAB in 1938 by the late President Roosevelt.

Ryan told AVIATION WEEK the FBI investigation is a routine security check required for all newly appointed federal officials.

▶ **Improper Influence?**—The White House and Senate committee actions followed a public demand for a CAB investigation by Rep. Mendel Rivers, southern Democrat who supported Eisenhower in the last election. Rivers' attack was directed at CAB's handling of the Balboa case.

But his remarks also raised the question of improper influence by big airlines on the Board and the White House, and were skeptical concerning the handling of the overseas merger case of Pan American World Airways and American Airlines. Ryan was the only CAB member named by the congressman.

"The President himself ought to ask a great many questions," Rivers declared. "I may request that the House inquire into the influence and power of the monster airline empires to whom national political changes obviously mean nothing. . . . The citizens of this country like the appearance of evil no better under Eisenhower than they did under Truman.

"It is my considered opinion that the handling of the so-called Balboa case, both by the White House and the CAB, is tainted with the appearance of evil."

▶ **"Massive Empires"**—In the Balboa case, CAB three times has unanimously recommended to the White House an interchange agreement between Eastern Air Lines and Braniff Airways and between Pan American and National Airlines.

Eastern and PAA have favored merging, but the Board has supported combining one big carrier with a smaller line.

Twice under the Truman Administration and a few months ago under the Eisenhower Administration, the White House has tossed the Board's recommendations back for further consideration.

Referring to EAL and Pan American, Rivers said: "I am ashamed to say that the political power of these giants has been nothing less than awesome. The House might be well-advised to try to find out how these massive empires operate in Washington . . . I was one of millions of Americans in this country who voted against this kind of influence last November. . . ."

▶ **Presidential Approval**—Here are the developments:

- **The FBI investigation** is being conducted with the President's knowledge and approval.
- **After several weeks** of investigating, the FBI filed an interim report at the White House.

Whatever evidence against CAB was contained in this report, it apparently was considered sufficient to continue the investigation.

- **The Senate Permanent Investigating Committee,** headed by Sen. Joseph McCarthy, is making its own investigation.

The Senate committee, however, probably will sit back with whatever evidence it might develop and await the final outcome of the FBI investigation and possible White House action.

Complaints of airline influence on CAB were made some time ago to the Senate group. But at that time, investigators anticipated that after a routine check the complaints would be dismissed.

Only within the past two weeks' time has the committee actively pursued the matter.

- **A reorganization** of the Board is under consideration by the White House as a possible outcome of the investigations.
- **There is the prospect** that the Senate committee will take up the CAB investigation should it develop that the White House does not take action considered appropriate by the senators.

▶ **Syndicated Springboards**—Although Rivers' skepticism concerning the handling of the Balboa and overseas merger cases seems to be what touched off the investigations, FBI and Senate investigators reportedly have delved more deeply for information on Board activities.

The investigators have used syndicated columns that appeared over the past several years as a springboard for interrogating witnesses. These articles were written by columnists Stewart and Joseph Alsop, Marquis Childs, and Drew Pearson.

Some of the columnists' articles are directed at alleged PAA and American influence in connection with the overseas merger case.

Mentioned by the columnists: John Steelman, White House adviser under the Truman Administration; Matt Connelly, former White House secretary; Samuel Pryor, Pan American vice president; Carlene Roberts, vice president of American Airlines, and CAB chairman Ryan.

White House-CAB dispute over the overseas merger case resulted in the resignation of former CAB chairman Joseph O'Connell.

100-Seat Copter

Helicopters "carrying loads of 100 passengers in the not too distant future" are forecast by Igor Sikorsky, noted copter designer and builder.

Speaking at ceremonies marking delivery of the first Sikorsky S-55 to National Airlines at Newark (N. J.) Airport, he noted that Sikorsky Aircraft is working on a twin-engine copter that will carry 50 passengers.

Sikorsky envisions the time when all flights of 200 mi. or less will be made by helicopter.

Connie Cutbacks

- **Military orders squeeze Lockheed civil output.**
- **Scarce foreign dollars narrow airliner market.**

By Richard Balentine

Substantial curtailment of commercial aircraft production was forecast last week by Lockheed Aircraft Co.

The company predicts domestic and foreign commercial sales will be restricted "because of the continuing requirements of the national defense program." Military production may climb above the 80% mark set in 1952, Lockheed says.

▶ **Foreign Dollars Scarce**—The company makes the prediction in a prospectus filed with the Securities & Exchange Commission in connection with its offering of 26,000 new stock shares at $19.35 each and 18,520 shares previously registered with the commission. Sale of the stock will begin Nov. 18 if approved by SEC.

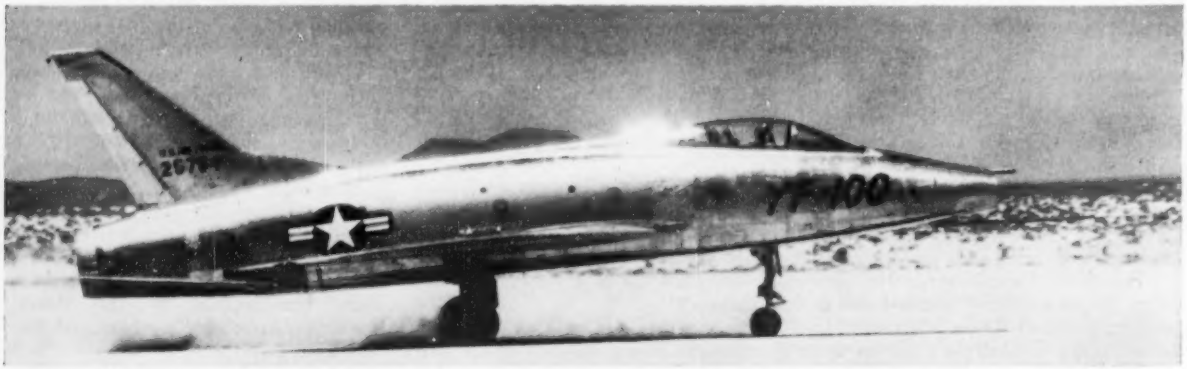
Another factor affecting commercial production, Lockheed points out, is the limited availability of dollars in foreign countries.

This condition narrows the market for commercial transport aircraft, the firm reasons, accentuating competition between American manufacturers.

Foreign manufacturers, particularly those in the sterling countries that are in competition with American concerns in the same field, therefore are placed in a more favorable position to sell to foreign countries.

▶ **$1.5-Billion Backlog**—Lockheed had an estimated backlog of $1,572,429,000 in orders on Aug. 30, 91% of which represented military orders. Gross inventories of work in process on that date amounted to approximately $214,727,000.

The company disclosed that its busi-



NORTH AMERICAN F-100 SUPER SABRE claims a new world's speed mark of 754.98 mph. over longer 15-km. course, but . . .

F-100, F4D Battle for Top Speed Laurels

Los Angeles—North American Aviation last week claimed a world speed mark of 754.98 mph. for its F-100 Super Sabre over a 15-km. course, but the claim brought only derisive comment from Douglas Aircraft Co., whose F4D holds the 3-km. course record of 753.4 mph.

North American cited Federation Aeronautique Internationale rules as stating the fastest speed for a straight course is recognized as the official world's record (AVIATION WEEK Nov. 2, p. 16).

The company quoted National Aeronautic Assn. timer Bertrand Rhine as saying the mark will be submitted as a new world's speed record.

A Douglas spokesman indicated his firm will take no official action in connection with NAA's claim but commented: "After all, tradition has something to do with these things. The 3-km., four-pass course is the recognized speed classic and always has been."

▶ **767-Mph. Top**—The F-100 was piloted over the Salton Sea course by Lt. Col. F. K. Everest, chief of the flight test operations laboratory of Air Research & Development Command's Edwards AFB.

DOUGLAS XF4D-1 SKYRAY "is still a faster airplane," says a Douglas spokesman.

He was clocked at 767.276 and 742.684 in his two passes over the nearly 9-mi. course.

Rules permit a 15-km. course to be run at any altitude. Col. Everest made his passes 100 ft. from the ground.

Previous top speed for the 15-km. course was 707.889 mph set Sept. 1 at the National Aircraft Show in Dayton, Ohio, by USAF Capt. Harold Collins in an F-86D.

▶ **Sudden Switch?**—"This 15-km. course is a tough one to fly because at least half of it is over water and it is difficult to pick out landmarks," Everest said. "It's much harder to hold a steady course for such a long distance."

Commented a Douglas spokesman: "The F4D is still a faster airplane.

"They tried to top our F4D mark by the required 1% and couldn't do it. All previous speed records have been set on the 3-km. course, including those of North American itself as well as the British and others. How come all of a sudden it's the 15-km. course?"

ness for 1952 was made up of the following: military sales, 80%; commercial sales, 8%; modification and overhaul of military aircraft, 7%; returns from research and development program, 3%; and miscellaneous business for military and commercial customers, 2%.

Approximately 40% of Lockheed's business is subcontracted, the firm reports. Expanded and accelerated production schedules have forced Lockheed to enter into credit agreements with 18 banks to provide $60 million to carry it through June 30, 1954. By Oct. 15, the company had borrowed $40 million.

▶ **Increasing Capacity**—This year Lockheed will spend $8 million on increasing its plant capacity. A special facilities contract received from the Air Force provides for the construction and equipping of a government plant at Palmdale Airport, approximately 55 mi. north of the main plant at Burbank.

At Palmdale, Lockheed also has constructed a $400,000 service hangar and other miscellaneous buildings on land leased from Los Angeles County. Air Force has reached agreement on purchasing the land from the county. Since 1950, the company has spent $17,995,000 to increase its plant capacity.

▶ **Connie Losses**—In its prospectus, the company admits its losses on early Constellation production and the development of the Saturn feederliner, which it abandoned in 1947 because of insufficient sales prospects and difficulties in obtaining component parts. Losses were:

- **1946—$12,440,096**
- **1947—$20,846,061**
- **1948—$4,658,068**

By Sept. 27 of this year, Lockheed had delivered 38 Super Constellations to airlines. Employment was 54,480.

West Coast May Try Bulk Airmail

Airlines probably will start carrying first-class mail between major West Coast cities, according to Postmaster General Arthur Summerfield.

It all depends upon whether the airlines can match competitive cost of surface transportation. The Comptroller General ruled that Post Office could switch mail from surface to air transport wherever costs are competitive.

The pioneer New York-Chicago and Washington-Chicago airlift of preferential mail (AVIATION WEEK Oct. 12, p. 20) is "going well," according to a Post Office official.

Meanwhile, the local service airlines have offered to carry first-class mail at 45 cents a ton-mile. Post Office is studying competitive costs of that rate on two test route segments, and has promised Local Airlines Conference director Donald Nyrop an answer soon.

Aircraft Output Hits Postwar Peak

Industry profits appear headed for new record as 1953 military and civil production nears 16,700 planes.

The aircraft industry appeared to be headed for its most profitable and productive postwar year in 1953 as it moved well into the final quarter with only the prospects of spreading strikes in major airframe and engine plants marring the outlook.

Here are highlights of the prospects for 1953:

- **Production** has reached record postwar levels.
- **Profits** through the first three quarters are substantially greater than for the same period of the previous peak year of 1952.
- **Backlogs** remained at a record level despite Pentagon efforts to reduce them.

The industry will produce an estimated total of 16,700 military and civil aircraft during 1953, according to an Aircraft Industries Assn. survey. This compares with 12,509 aircraft built in 1952.

▶ **Increase Expected**—Military production is expected to jump from 9,000 planes in 1952 to 12,000 for 1953, while civil output will rise from 3,509 in 1952 to 4,700 this year.

Before the North American Aviation strike, the industry was producing military aircraft at the rate of 48 every working day—with more than half this output consisting of gas turbine-powered planes. Total jet-powered aircraft production for the year is estimated at slightly more than 6,000 planes, representing 23 different models of combat aircraft.

AIA reported that sales of complete aircraft, engines and propellers for the first half of 1953 totaled $4.2 billion, just $100 million short of the $4.3-billion total sales for the complete year of 1952. The first-half sales total for 1952 was $2.9 billion. Reports by major companies on operations for the first nine months of 1953 continued the trend of rising sales and profits.

▶ **Obligations Gain**—Meanwhile, there were indications that both USAF and Navy were obligating fiscal 1954 procurement funds at an accelerated rate during October after an extremely slow start during the first quarter (July-September) that had the effect of a virtual freeze on new contracts to major airframe and engine producers.

Pentagon sources indicated the first quarter delays were due in part to the necessity for both USAF and Navy's Bureau of Aeronautics to re-program their fiscal 1954 procurement obligations after final congressional action on the current Defense Department budget.

Industry observers reported that military airframe deliveries still were slightly below the 1,200-plane monthly rate originally scheduled as the peak production rate to be reached late last spring. Major production slippages were confined to special situations where technical difficulties were being experienced with airframes or engines.

▶ **Minor Stretchout**—It now is doubtful if the industry will be required to reach the earlier production peak goals. Defense Department policy will encourage a minor "stretchout" of production deliveries to maintain the present rates at the 1,000-plane-a-month plateau for a longer period to reduce actual expenditures for aircraft during the current fiscal year. This would require less cash outlay by a Republican Administration still striving to get within hailing distance of a balanced budget.

Despite a steadily rising sales curve and a slowly diminishing curve of new orders, it is expected that the industry backlog will continue to rise during the second half of 1953 from the $18.9-billion total at the end of the first six months of this year—a record postwar peak.

Security Letup?

Aircraft industry is expected to have easier sailing in the release of information on its products if the revised security regulations proposed by Attorney General Herbert Brownell become official.

One big help will be elimination of the security classification "restricted" now used as a catchall to withhold information for which there is no legitimate security bar.

The new rules also would try to establish an effective system for periodic declassification of information after the reasons for classifications have passed.

Michigan Tries to Lure Copter Firms to State

Four top helicopter concerns in the East have been queried on the possibilities of moving at least a portion of their operations into Michigan by an aircraft manufacturing advisory committee of that state's Economic Development Department.

The firms visited by the committee—headed by Peter Altman, aviation engineering consultant and Continental Motors Corp. vice president—include: Sikorsky, Piasecki, Kaman and Doman.

Strike Setback

- **Douglas workers turn down union walkout.**
- **Balloting upsets plans for industry wage fight.**

Los Angeles—Plans of two unions for a coordinated wage fight throughout the aircraft industry received a severe setback last week when International Association of Machinists (AFL) workers at the Douglas Aircraft Co. apparently refused to go along with strike plans.

IAM officials would not reveal results of balloting at the Santa Monica and El Segundo Divisions on Nov. 1. It was learned unofficially, however, that IAM workers at Santa Monica turned down union strike plans, although they voted to reject the latest company offer.

Union officers also were jolted by the vote at El Segundo, which was said unofficially to be in favor of acceptance of the company proposal. The El Segundo workers did not vote on strike authorization.

▶ **Upset Plans**—Members of the United Auto Workers (CIO), walking the picket line at North American Aviation plants for the second week, obviously were unhappy with results of the IAM balloting. It definitely upset plans of the two unions for coordinated action throughout the industry.

Union leaders at both IAM and UAW locals were meeting to "discuss the whole thing." All appeared reluctant to talk about the Douglas vote.

▶ **Reluctant IAM**—One source said the Santa Monica vote in favor of a strike was only 67%, falling short of the 75% required for approval.

Balloting on the company wage proposal was 1,863 in favor of rejecting the plan and 1,124 for accepting it, another source reported. Figures on the question of authorizing the negotiating committee to call a strike were 1,855 for and 923 against, he said.

Unofficially, the El Segundo vote was said to be 1,832 to 1,432 in favor of accepting the company offer.

Reluctance of IAM officials to discuss the vote seemed to confirm the reports.

▶ **Longest Picket Line**—In the North American walkout, meanwhile, both sides indicated a willingness to resume negotiations. A spokesman for UAW Local 887 declared the union is ready to meet in joint session "at any time."

NAA said it is "ready to resume negotiations at any time when federal mediator John Fenton feels progress can be made."

Fenton, meeting separately with both sides, had given no indication that joint sessions would be resumed, however.

Judge Frank G. Swain issued a temporary restraining order limiting pickets at North American to every 20 ft. in single file and ruled they must remain 200 yd. from company property except at the gates. This resulted in what Paul H. Schrade, Local 887 president, called "the world's longest picket line"—with an estimated 200 workers, 20 ft. apart, parading in a one-half mile circle in front of NAA's main offices in Inglewood.

Negotiations at Lockheed with the IAM were continuing.

▶ **Peaceful Solution**—Donald W. Douglas, commenting on results of the IAM balloting at his firm, said "results reported to us thus far appear to be satisfactory, and we will continue to seek by sensible negotiation a just end and peaceful solution of this labor dispute."

Prior to their vote, the Douglas workers were handed union leaflets telling them: "Today is the day that the Douglas employes either vote to support their negotiating committee or vote to cut the ground out from under their committee."

It seemed last week that the ground had been cut from under not only the negotiating committee but also from under IAM-UAW cooperation in its earliest stages.—**WJC**

Doman Lays Off Production Men

Doman Helicopters, Inc., Danbury, Conn., has cut employment from 114 to 46 "because of realignment of operations brought about by decision to supply components to Hiller Helicopters, Palo Alto, Calif., and Doman-Fleet Helicopters, Ltd., Ft. Erie, Canada (AVIATION WEEK Nov. 2, p. 7), rather than manufacture complete helicopters in Danbury."

Production personnel were affected in the layoff.

The firm recently completed its second YH-31 military copter, which was scheduled to begin its flight test program last week. The first YH-31 has accumulated approximately 50 hr. of air time since its initial flight Apr. 27 this year (AVIATION WEEK May 11, p. 16).

The layoff is temporary, Doman emphasizes, noting that under the new program of supplying components to Hiller and Doman's Canadian subsidiary, the number of production workers at Danbury ultimately will increase.

Air Force Information

Air Force is changing the name of its Public Information Office to the Office of Information Services. Air Secretary Harold Talbott will continue to control the office.

Air Contracts

- **AF and Navy first-quarter awards drop sharply.**
- **But military spending stays at last year's level.**

New contracts for aircraft and related procurement by Air Force and Navy dropped sharply during the first quarter of fiscal 1954.

Defense Department records show:

- **USAF and Navy obligations** plummeted from a total of $639 million obligated in April to $308 million in May and $202 million in June. The result: Air Force and Navy started fiscal 1954 on July with a carryover of unobligated procurement funds totaling more than $3.4 billion.
- **Obligations** of $282 million for July-September only nibbled at this carryover. At the end of the quarter on Oct. 1, the two services still had about $3 billion in carryover funds to use up before starting to eat into the $4.9 billion in new money appropriated for fiscal 1954.

But spending for aircraft and related procurement is keeping fairly well up to schedules that call for a total $8.3-billion expenditure during the current fiscal year. The expenditure reached an estimated $8.5 billion for fiscal 1953.

- **Total USAF and Navy expenditure** of $2,113 million for the first quarter of 1954 nearly equaled the $2,150 million estimated by Defense Department in congressional testimony this summer.
- **Navy's total expenditure** of $532 million was higher than the $500 million anticipated.
- **USAF's total expenditure** of $1,581 million fell slightly short of the expected $1,650 million.

Other highlights of the procurement fiscal picture (See table, right):

- **Since the outbreak** of the Korean war in mid-1950, a total of $48.9 billion has been made available for aircraft and related procurement—including guided missiles, drones, production facilities.
- **Unexpended procurement funds** on Oct. 1 totaled $29.3 billion—enough to finance the industry at a rate of close to $10 billion a year for three years without new annual appropriations. Of this, $21.2 billion was for Air Force and $8.1 billion for Navy.
- **USAF and Navy** had more than $7.8 billion unobligated procurement money on hand Oct. 1. This means an average quarterly obligating rate of $2.6 billion if the money is to be obligated by the end of the fiscal year next July 1—or approximately 10 times the $282 million obligated during the first quarter of the year.

Aircraft Procurement: Obligations, Expenditures by Month, 1951-54

Aircraft Procurement: Obligations, Expenditures by Month, 1951-54

(Millions of dollars)

Fiscal Year and Month	STATUS OF OBLIGATIONS												STATUS OF EXPENDITURES								
	TOTAL				NAVY				AIR FORCE				TOTAL			NAVY			AIR FORCE		
	Funds Avail.	Obls. Incurred Monthly	Unobl. Bal.	Unpaid Obls.	Funds Avail.	Obls. Incurred Monthly	Unobl. Bal.	Unpaid Obls.	Funds Avail.	Obls. Incurred Monthly	Unobl. Bal.	Unpaid Obls.	Funds Avail.	Expenditures Monthly	Unexp. Bal.	Funds Avail.	Expenditures Monthly	Unexp. Bal.	Funds Avail.	Expenditures Monthly	Unexp. Bal.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
FY 1951																					
Balance Brought Forward	1,092	.....	1,092	3,191	263	.....	263	847	829	.....	829	2,344	4,283	.....	4,283	1,110	.....	1,110	3,173	.....	3,173
July	1,315	1,691	−375	4,739	486	363	124	1,174	829	1,328	−499	3,565	4,506	143	4,364	1,333	35	1,298	3,173	108	3,066
August	1,758	581	−515	5,166	929	564	1	1,682	829	17	−516	3,484	4,949	154	4,653	1,776	57	1,684	3,173	97	2,969
September	7,120	282	4,567	5,302	2,528	322	1,280	1,960	4,592	−40	3,287	3,342	10,308	146	9,864	3,372	44	3,236	6,936	102	6,628
October	7,120	1,775	2,791	6,921	2,528	63	1,216	1,987	4,592	1,712	1,575	4,934	10,308	156	9,709	3,372	36	3,200	6,936	120	6,509
November	7,119	96	2,694	6,833	2,528	49	1,167	1,985	4,591	47	1,527	4,848	10,307	184	9,524	3,372	51	3,149	6,935	133	6,375
December	7,132	465	2,241	7,091	2,528	44	1,123	1,979	4,604	421	1,118	5,112	10,320	207	9,330	3,372	50	3,099	6,948	157	6,231
January	9,425	1,401	3,134	8,344	2,703	155	1,143	2,102	6,722	1,246	1,991	6,242	12,591	149	11,453	3,528	33	3,223	9,063	116	8,230
February	9,425	692	2,442	8,795	2,703	187	956	2,229	6,722	505	1,486	6,566	12,591	240	11,213	3,528	59	3,164	9,063	181	8,049
March	9,463	1,046	1,436	9,575	2,703	477	480	2,649	6,760	569	956	6,926	12,591	263	10,948	3,528	56	3,137	9,063	207	7,841
April	9,489	425	1,035	9,723	2,701	87	390	2,683	6,788	338	645	7,040	12,589	275	10,672	3,526	51	3,054	9,063	224	7,618
May	9,991	1,275	263	10,709	3,203	84	809	2,705	6,788	1,191	−546	8,004	13,095	283	10,895	4,032	61	3,499	9,063	222	7,396
June	10,766	823	212	11,197	3,202	752	54	3,387	7,564	71	158	7,810	13,795	322	11,274	4,032	58	3,442	9,763	264	7,832
FY 1952																					
July	3,053	3,053	.....	13,930	1,097	1,097	.....	4,403	1,956	1,956	.....	9,527	14,078	315	13,765	4,484	82	4,403	9,594	233	9,362
August	3,993	940	.....	14,494	1,268	171	.....	4,490	2,725	769	.....	10,004	14,998	375	14,308	4,655	83	4,490	10,343	292	9,818
September	4,900	907	.....	15,104	1,386	118	.....	4,530	3,514	789	.....	10,574	15,905	296	14,919	4,773	78	4,530	11,132	218	10,389
October	15,509	1,308	9,301	16,047	3,983	244	2,353	4,691	11,526	1,064	6,948	11,356	26,413	357	25,069	7,325	77	7,004	19,088	280	18,065
November	15,509	657	8,643	16,305	3,983	117	2,235	4,714	11,526	540	6,408	11,591	26,413	402	24,667	7,325	95	6,910	19,088	307	17,757
December	15,549	490	8,194	16,348	3,983	283	1,953	4,891	11,566	307	6,241	11,457	26,413	445	24,223	7,325	105	6,805	19,088	340	17,418
January	15,558	776	7,428	16,649	3,983	257	1,697	5,028	11,575	519	5,731	11,621	26,413	474	23,749	7,325	119	6,686	19,088	355	17,063
February	15,552	478	6,942	16,651	3,977	48	1,641	4,961	11,575	430	5,301	11,690	26,413	477	23,272	7,325	116	6,570	19,088	361	16,702
March	15,552	623	6,320	16,734	3,977	209	1,433	5,065	11,575	414	4,887	11,669	26,413	526	22,746	7,325	96	6,474	19,088	430	16,272
April	15,552	1,353	4,967	17,492	3,977	504	929	5,410	11,575	849	4,038	12,082	26,412	573	22,170	7,325	159	6,315	19,087	416	15,855
May	15,552	1,774	3,193	18,678	3,977	69	860	5,337	11,575	1,705	2,333	13,341	26,412	585	21,584	7,325	142	6,172	19,087	443	15,412
June	15,549	2,119	1,070	19,941	3,977	808	52	5,968	11,572	1,311	1,018	13,973	26,412	842	20,742	7,325	176	5,996	19,087	666	14,746
Total FY 1951 and FY 1952	26,101	.....	1,070	19,941	7,124	.....	52	5,968	18,977	.....	1,018	13,973	28,934	.....	20,742	7,916	.....	5,996	21,018	.....	14,746
FY 1953																					
July	15,601	2,010	13,591	21,519	3,541	131	3,410	6,009	12,060	1,879	10,181	15,510	35,192	428	34,764	9,446	89	9,357	25,746	339	25,407
August	15,601	2,774	10,816	23,789	3,541	63	3,346	5,938	12,060	2,711	7,470	17,851	35,192	505	34,259	9,446	134	9,223	25,746	371	25,036
September	15,605	925	9,896	24,020	3,541	547	2,800	6,356	12,064	378	7,096	17,664	35,192	694	33,566	9,446	128	9,095	25,746	566	24,471
October	15,599	871	9,019	24,250	3,541	36	2,764	6,234	12,058	835	6,255	18,016	35,192	643	32,923	9,446	159	8,937	25,746	484	23,986
November	15,599	595	8,425	24,234	3,541	42	2,722	6,144	12,058	553	5,703	18,090	35,192	601	32,322	9,446	132	8,805	25,746	469	23,517
December	15,544	1,977	6,392	25,402	3,541	876	1,846	6,786	12,003	1,101	4,546	18,616	35,192	795	31,526	9,446	233	8,571	25,746	562	22,955
January	15,541	626	5,763	25,420	3,541	333	1,513	6,982	12,000	293	4,250	18,438	35,192	600	30,927	9,446	133	8,438	25,746	467	22,489
February	15,564	599	5,187	25,307	3,541	173	1,339	6,958	12,023	426	3,848	18,349	35,192	709	30,217	9,446	198	8,240	25,746	511	21,977
March	15,569	887	4,303	25,298	3,541	522	818	7,207	12,028	365	3,487	18,091	35,192	881	29,337	9,446	267	7,973	25,746	614	21,364
April	15,569	639	3,666	25,048	3,541	230	588	7,201	12,028	409	3,078	17,847	35,192	889	28,447	9,446	236	7,737	25,746	653	20,710
May	15,571	308	3,358	24,607	3,541	20	567	6,993	12,030	288	2,791	17,614	35,192	729	27,718	9,446	227	7,510	25,746	502	20,208
June	15,570	202	3,157	23,664	3,540	144	423	6,933	12,030	58	2,734	16,731	35,192	1,125	26,593	9,446	191	7,319	25,746	934	19,274
Total FY 1951, FY 1952, and FY 1953	40,600	.....	3,157	23,664	10,612	.....	423	6,933	29,988	.....	2,734	16,731	43,383	.....	26,593	11,365	.....	7,319	32,018	.....	19,274
FY 1954																					
July	2,433	173	2,263	23,240	630	23	606	6,790	2,809	150	2,550	16,450	28,318	587	28,220	7,469	157	7,311	19,349	430	18,919
August	5,123	34	7,915	22,481	1,859	28	1,807	6,534	6,264	6	6,108	15,946	31,466	799	30,079	8,598	122	8,349	22,769	608	21,731
September	5,123	74	7,841	21,804	1,859	118	1,689	6,569	6,264	−44	6,152	15,235	31,466	726	29,354	8,598	183	8,165	22,769	542	21,188

NOTES: (1) Includes the appropriations: Navy, Aircraft and Related Procurement; Air Force, Aircraft and Related Procurement. These appropriations include funds for such related procurement as guided missiles and drones, aircraft production facilities and administration, and certain other smaller related programs.

(2) Excludes Army aircraft procurement funds in Program 1600 of Procurement and Production, Army

(3) Funds available for obligation include total reimbursements (i.e., collected, receivable and anticipated) and total appropriation transfers (actual and anticipated).

(4) Amounts do not necessarily add to totals due to rounding.

Source: Dept of Defense.

NBAA Is Silent on Plane Needs

Business pilots fail to come up with design suggestions, despite manufacturers' pleas to tell us what you want.

By Frank Shea, Jr.

St. Louis—Lack of unanimity on the type of aircraft best suited to the needs of the business pilot and his employer was evident at the sixth annual convention of National Business Aircraft Assn. here.

Chief item on the association's agenda from the members' standpoint, was solution of the design problem. But in two full days of meetings, they devoted about an hour's discussion to the subject. Some 200 attended, 80% of them pilots.

▶ **Short Forum**—A design panel forum was getting into high gear when NBAA chairman Cole Morrow called an end to discussion because of "lack of time."

George Page, Aeronca, opened with the question: "Just what do you people really want in the way of business aircraft?"

▶ **Dissent From Floor**—Before anyone in the audience answered, Morrow declared that last year's delegates had more or less decided that they required a plane in the 250-mph. class, with crew of two and capacity for eight to ten passengers. But a roar of dissent from the floor greeted his comment.

One in the audience wanted to know what was wrong with the Convair 240 or 340 for their purposes. Another mentioned the T-36, originally designed for USAF, might be a good bet.

▶ **Engines**—Jack Williams, North American, brought engines into the discussion. He felt that the R1820 would be most suitable for twin-engine business planes, but indicated that smaller engines are on the drawing boards for a four-engine configuration. Some said turboprop engines should be considered.

"It would require an 18-20-passenger configuration for the type of plane you want," stated J. Gertess of Cessna.

▶ **Beech Entry**—Herb Rawdon of Beech said his company has a plane in the works which might fill the bill. But it is an Air Force plane, and when the group asked for more information, Rawdon declined, saying he had given all he was permitted to release.

In discussing the Learstar (Lear-modified Lodestar), Art Cruse of Lear cited increased efficiency of the Lodestar attained by a complete rebuilding from the bare frame. The aircraft now cruises at 245 mph., he said, at 10,000 ft.

As discussion continued, the spokesmen for the manufacturers urged repeatedly: "Tell us exactly what you want. Show us what the market is."

▶ **Critic Applauded**—A. T. Groves, chief pilot for Kimberly Clark Corp., was applauded loudly for his remarks to the group.

"I hate to criticize," Groves said, "especially as an NBAA member, but criticism is something that this organization can well stand. We haven't accomplished a thing. Let's stop beating around the bush. Let's take some constructive action and tell these people what we want!

"Let's face it," he continued, "we're backward; 250 mph. isn't enough these days. We need a faster plane. Don't forget for one minute that we're competing with the airlines. And when we finally do get our 250 mph., they'll be doing better than 400 mph. Let's look into four-engine aircraft, too. Start with a 400-mph. goal and work down, not a 250-mph. goal and work up. Why, we'd spend a fortune on modification for that type of plane before we were through.

"Whatever we do, though, the main thing is to get our heads out of the sand, get together and say in unison: 'We want an airplane and this is the type we want!' Until we do that, we're not going to get anywhere. It's up to us."

▶ **Beg to Be Heard**—As Groves sat down, hands throughout the audience begged for the chairman's recognition. These pilots had come a long way and were determined to have their innings. One or two were recognized briefly, before Morrow insisted the discussion close.

Later, one pilot expressed his feelings: "I guess I'll just climb into my tired old Mallard and go back home—fly back next year in that same Mallard, and who knows for how many years after that?"

▶ **Other Groups**—Another comment came from Groves. Following his outburst from the floor, he said:

"There are other organizations besides NBAA," he said, "and since I've seen nothing constructive accomplished here, I'm going to them. I'm not the only one. Something's got to be done, and soon. We (business flyers) won't give up until we've got the airplane specifically designed to our needs."

▶ **Other Interests**—The convention started with a business session and members forum, where pilots could ask operational questions.

Gordon Bennett, from the office of Commerce Undersecretary Robert Murray said a user tax on gas may come soon because of increasing pressure from Congress. He told the group, "If you want luxury items at these airports that you'll use about once a year, you're going to pay for them."

▶ **Murray's Aims**—Bennett emphasized that Murray's chief aims were:

- To get government out of aviation wherever industry can handle the job.
- Eliminate government-supplemented luxuries.
- End federal harassment of aviation.

"We want to cooperate with you," Bennett concluded. "We invite your suggestions, but don't ask for too much or you'll end up paying."

▶ **Mentions Editorial**—Herbert O. Fisher, former executive secretary of the association, now chief of the aviation development division of the Port of New York Authority, spoke on "Today's Challenge to Air Transportation."

Fisher opened with the remark, "I imagine by now you've all seen the editorial on business flying which appears in one of our leading aviation magazines. I'm on both sides." (See AVIATION WEEK Oct. 26, p. 102).

Having stated his position briefly, Fischer continued his talk, citing the importance of business flying and discussing airport problems.

At the annual banquet, Fred B. Lee, Civil Aeronautics Administrator, told the group that CAA safety functions are being carefully scrutinized with a view to eliminating unnecessary federal activities.

Speaking of demands for services from the federal government, he said, "We are operating under rigid economy, and in each case we must decide what will best serve the national interest. CAA is only human, however, and judgment can be faulty. . . .

"We're greatly interested in business flying . . ." Lee said, "if you have any problems, lay them on the table and we'll examine them together."

Convair F-102 Crashes In Emergency Landing

Convair's delta-wing F-102 made a wheels-up emergency landing just after takeoff at Edwards AFB, Calif., last week and apparently was badly damaged. Loss of power was blamed.

Dick Johnson, Convair's chief project test pilot, suffered "major injuries," and a company spokesman said he would be flying again in a month.

The plane crashed off the end of the runway, but the Air Force would release no further details of the accident. An Air Force board of officers has been appointed to investigate the crash.

The prototype F-102 made its first flight at Edwards Oct. 24.

A second prototype will be flying early in December. It is nearing completing at San Diego and the testing program is not expected to be delayed long.

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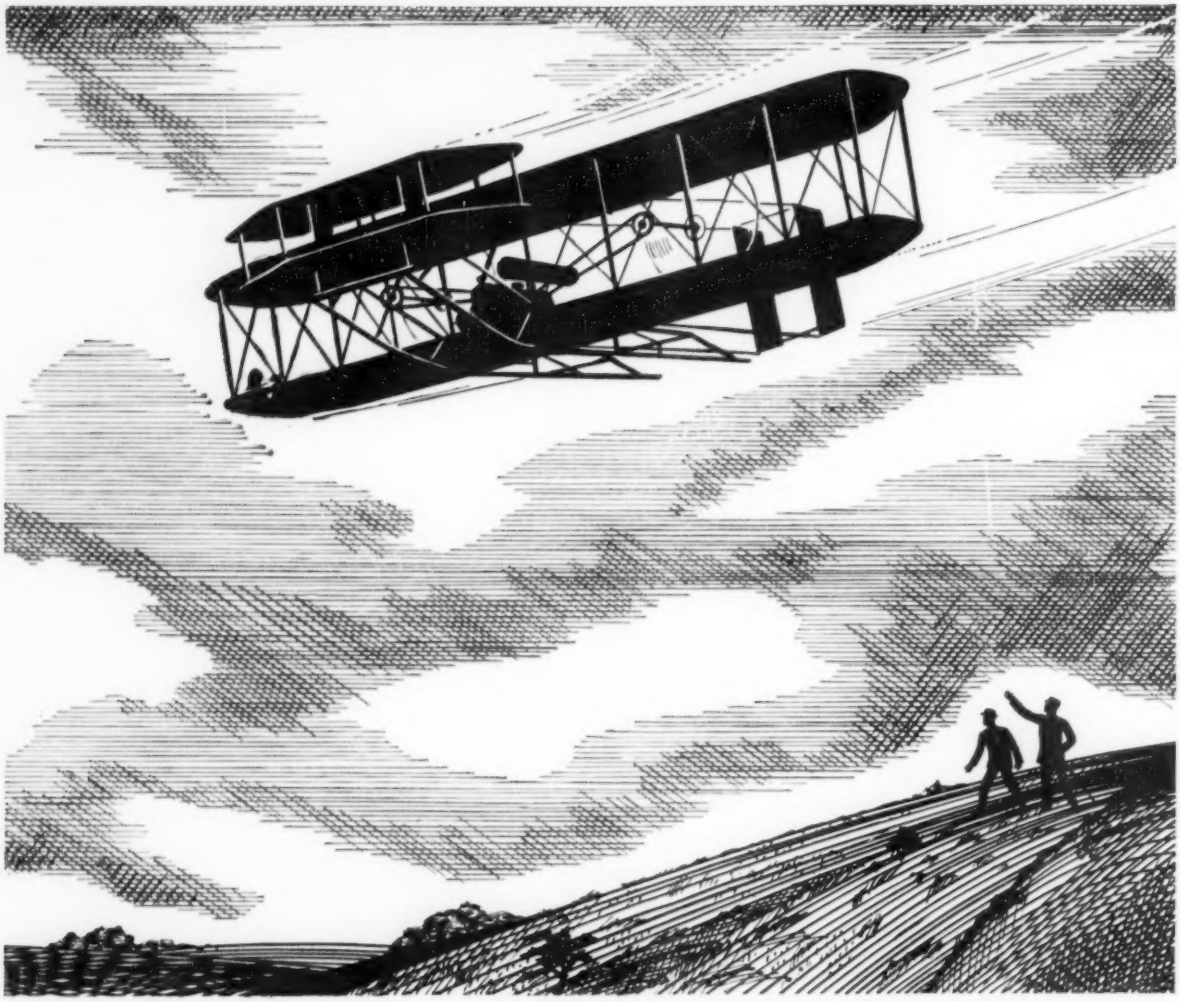

Nineteen hundred and fifty-three marks man's first half-century of powered, heavier-than-air flight. Fifty years ago, on December 17, 1903 the Wright Brothers successfully built and flew a 12 horsepower biplane. For 12 historic seconds Orville Wright took the controls over Kitty Hawk.

Their flight plan was "progress"...

What made this flight possible?

It was the way Wilbur and Orville Wright approached the problem. The Wright Brothers succeeded because they studied the basic principles of flight, then built a flying machine to fit these specifications. Their pioneering has made possible better and better flying machines, including today's jets. Their flight plan was truly "progress."

Esso Standard Oil Company supplied the fuel for the Wright Brothers' first successful flight. Since then, Esso Aviation Products have kept constant pace with aviation's rapid progress – the latest example being the recently announced Esso Turbo Oil 15. This oil is currently approved for the Pratt and Whitney Aircraft J-57 jet engine and the Curtiss-Wright J-65 Sapphire jet engine.

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LETTERS

Robson & GCA

I have just read Capt. Robson's free-wheeling column on GCA in your Aug. 24 issue.

Yes, Capt. Robson, GCA does have blind spots and blind speeds, as well. Having developed and produced over 400 GCA equipments for military and civil airports in 24 countries, we are perhaps in a better position than most manufacturers to discuss GCA's operational limitations and its advantages.

Incidentally, Gilfillan has never claimed GCA to be the Alpha and Omega of aviation safety.

Airplanes, pilots, radios and blondes also have certain "blind spots," or shortcomings, but we all find them useful, yes indispensable despite their inherent weaknesses. Would Capt. Robson ban airplanes because of stalling speeds, pilots because of gust locks, radios because of cross talk, or blondes because of fickleness?

No, Captain, GCA does not relieve you "of your usual chores." GCA enables you to devote your full attention to your airspeed, compass, altimeter, power and manifold pressure, etc. You don't have to ignore these vital dials while staring at a cross-pointer indicator and trying to outguess its two dimensional bends and fluctuations. GCA information reaches you aurally, rather than through your over-saturated visual channels.

As a frequent airline passenger I wouldn't want the Captain "to delegate any legal or moral safety responsibility to another person" but my insurance company and family will be happier if that harassed, tired pilot has accurate, calm, reassuring, radar, positive information coming to him when we are cruising through thick, grey soup at two miles a minute.

Capt. Robson advises, "the object of all this is not to lampoon radar." Equally there is no intention here to give pilots the business. AVIATION WEEK for Mar. 16, 1953, reported on a study made at Washington National airport by a joint committee of ALPA, ATA and CAA. During a six months' period using an excellent *combination of pilot and radar* for full traffic control the following results were achieved:

- IFR capacity of Washington National was doubled.
- Traffic delays due to weather were cut to one-third of former time.
- Stacking was virtually eliminated.
- Departure delays were cut from two hours to ten minutes.
- Traffic delays due to missed approach or lost aircraft were virtually eliminated.
- Safety of terminal area traffic through positive anti-collision control was increased.

During the same period a similar radar operation at Chicago's Midway airport reduced holding time (planes milling over radio holding point) from 283 hours in December to four hours in January. As a result airlines saved $100,000 in one month, increased schedule reliability, boosted general safety in high-density traffic with the

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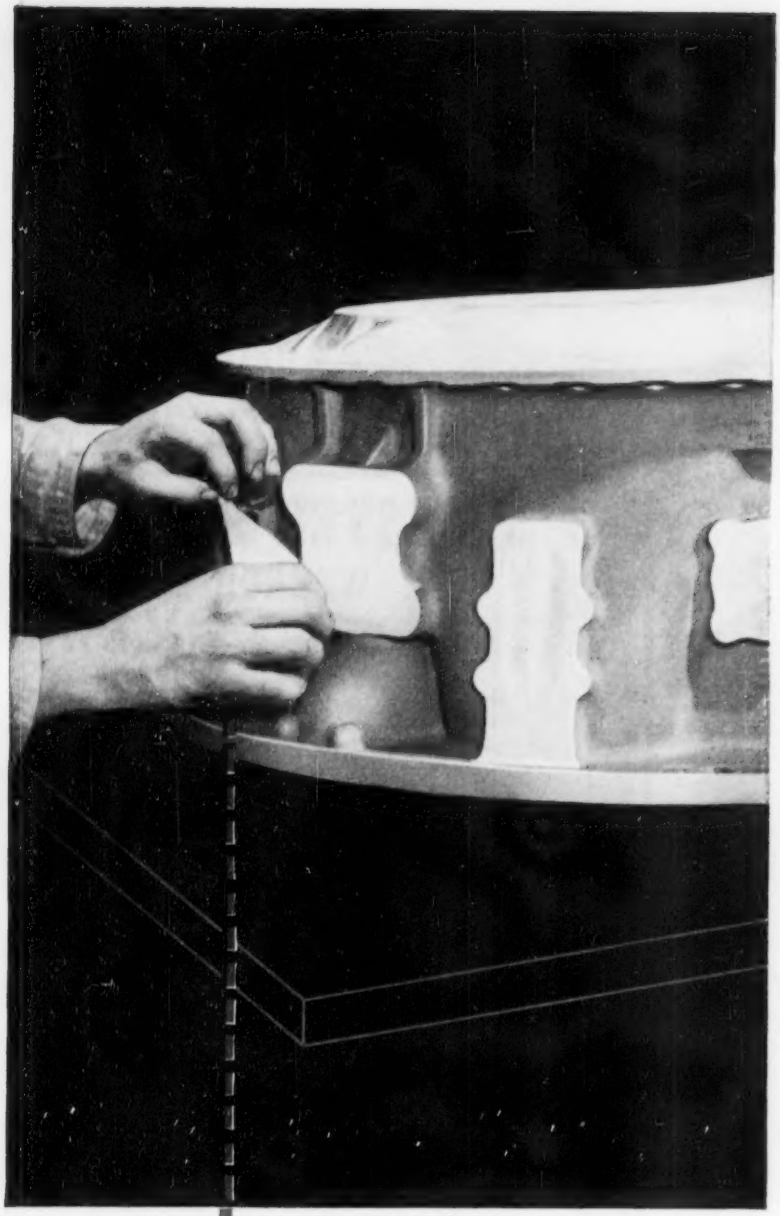

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Leonard David Callahan
Director of Public Relations
Gilfillan Bros., Inc.
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Los Angeles 6, Calif.

Let's Have Vigilance!

If you "Sunday Drivers" would stop screaming long enough maybe you could hear us "Truck Drivers" overtaking you. I know that's asking too much because if you ever closed your mouths long enough you would be able to open your eyes and study the collision reports for the postwar period which would make necessary a new whipping boy on whom to vent your tantrums. (Note: Drop your pencils kids, I know you can't hear another aircraft far enough away to prevent a collision!)

My tantrum is aimed at placing airline participation in mid-air collisions in its proper perspective.

There were 172 collisions during the 7-year period, 1946-52. Only 8 of these were between an airline and a private aircraft.

In only one instance was the airline crew found by the CAB to be solely at fault and that due to "failure to observe the other aircraft." In four instances the private pilot was found to be solely at fault and one of these was "operating recklessly or carelessly" while the other three were "straight-in approach without proper clearance, etc.," "failed to exercise reasonable prudence in approach," and "failure to fly standard lefthand pattern, etc." In two instances both crews shared responsibility for "lack of vigilance." In the one remaining instance the probable cause has not yet been determined.

Judging by the recent letters you fellows have written, I gather you don't have much respect for CAB decisions, which is of course a typical juvenile trait; it made me wonder though if this same disrespect was held for the CAA and the CAR at which you are so adept at quoting.

Of the 140 collisions between private aircraft, 1 out of every 4, 25.7%, 36 in number, were due to "OPERATING RECKLESSLY OR CARELESSLY." Like a gun or an automobile, an airplane in the wrong hands can be a deadly weapon. These 36 inexcusable accidents are exactly 4½ times as many as occurred between airline and private aircraft for all causes during this postwar period. Of the other 104 collisions between private aircraft, 80 were caused by "failure to observe the other aircraft" and the remaining 24 by variations of the lack of experience factor.

As to collisions between private and military aircraft, there were 20. In only seven accidents was the military pilot assigned sole responsibility.

What does all this prove?

As to collision participation, private pilots were involved in 97.7% of these 172 accidents. Only 4.7% were with airline pilots.

As to causes, it proves that pilots, like the thousands of pedestrians killed each year, occasionally have their heads up their

The Flexbelt Valve may be used with an electronic control circuit. A two-phase servo-type motor drives the valve through a gear reduction including an overload clutch. An integral position potentiometer geared to drum provides an electrical indication of valve position for speed feedback control.

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The Flexbelt Valve is designed for fast remote control of flow media on high-speed aircraft. It handles large flows and controls high pressures over a wide range with low power requirements.

Pressure of the flow medium holds the Flexbelt Valve member (Teflon-impregnated glass fabric) tightly against the orifice openings, thus cutting off flow completely when the valve is closed. Flow is controlled by rolling the Flexbelt onto a concentric motorized drum, thus peeling the belt away from the inside surface of a cylindrical seat. The valve seat, Flexbelt, and valve shaft form a sub-assembly permitting change in the valve flow characteristic by replacement as a unit.

Specific applications of the Flexbelt Valve include remote fuel flow control in aircraft fuel systems and control of maximum exhaust gas temperature by variation of fuel flow to a turbojet engine.

We believe our long experience, extensive facilities for developing, manufacturing and testing control system components for high-speed aircraft can be helpful to you. Our engineering counsel is at your service. We welcome your inquiry.

SPECIFICATIONS —

Flexbelt Valve Type 141VR

FLOW MEDIA: Water, gasoline, kerosene, oil, air, and gas. **FLOW MEDIUM TEMPERATURE:** Minus 65°F. to plus 250°F. **FLOW RANGES:** Up to 25 gpm of water at 25 psi pressure drop. **FLOW CHARACTERISTICS:** Linear, non-linear, logarithmic. **OPERATING PRESSURE:** Up to 1200 psi maximum. **OPERATING SPEED:** 3 seconds from full open to full close. **VOLTAGE:** 110 v. 60 cycles or 50 v. 400 cycles. **POWER:** 12 watts maximum. **POTENTIOMETER:** From 0–10,000 ohms in several sizes. **CONNECTORS:** AN3102-16S-5P for motor. AN3102-10SL-3P for potentiometer. **MATERIALS:** Housing — light weight aluminum; explosion-proof. Valve — aluminum and stainless steel. Flexbelt — Teflon-impregnated glass fabric; unaffected by aromatics in aircraft gasoline. Bearings — self-lubricating powdered metal. **WEIGHT:** 5 lbs. **SIZE:** 3" x 4½" x 4".

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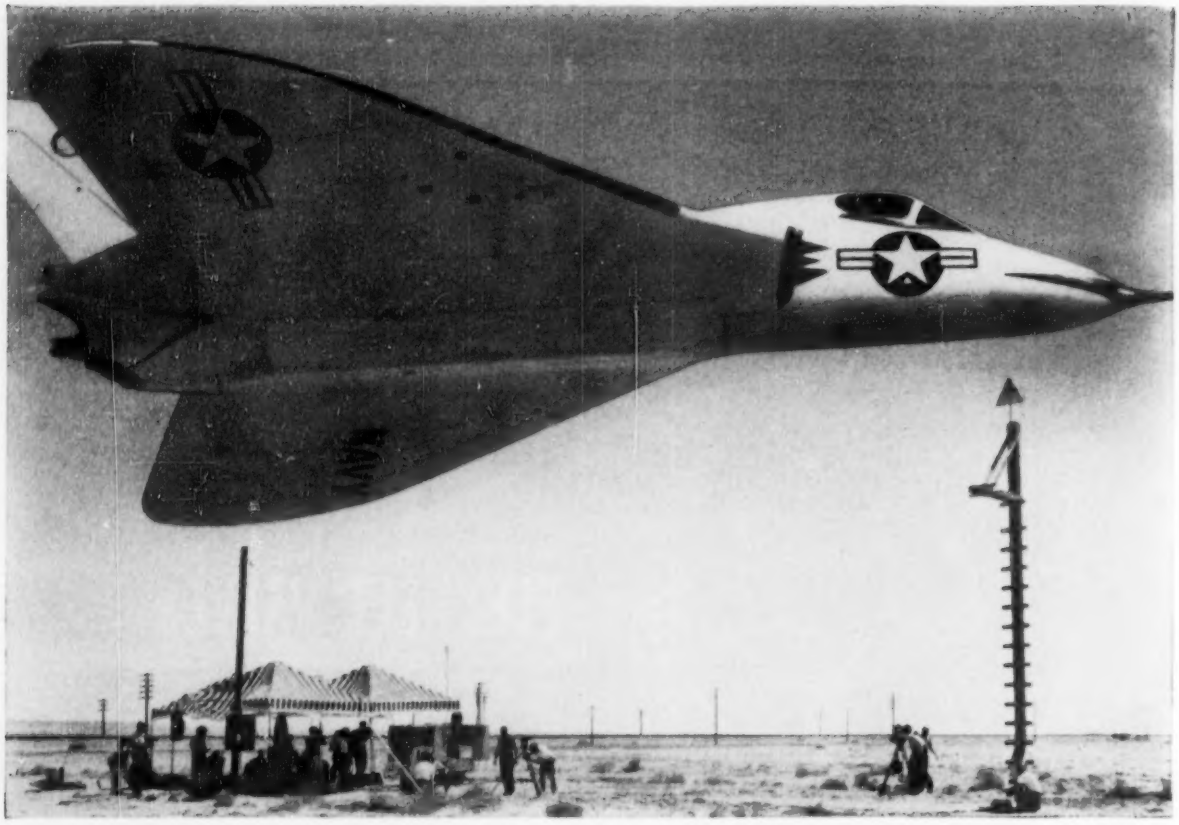


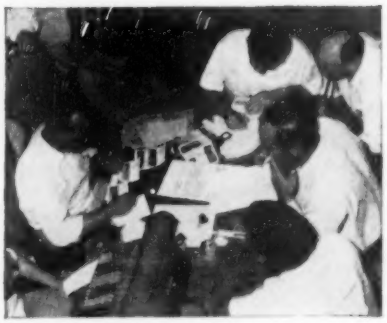
Westinghouse J 40 powers F4D to world speed record

U. S. Navy establishes new mark of 753.4 mph

A Westinghouse J 40 turbojet powered the Douglas F4D "Skyray" to 761.414 mph as it recaptured the world speed record for the United States by streaking to an official average of 753.4 mph over the required course.

Designed and manufactured by the Westinghouse Aviation Gas Turbine Division in South Philadelphia, Pa., the J 40 and other outstanding turbojets now are being produced at the huge Westinghouse jet engine plant in Kansas City, Mo.

This J 40 contribution to record-breaking jet progress is another example of Westinghouse turbojet leadership. Westinghouse Electric Corporation, Aviation Gas Turbine Division, Lester Branch P. O., Philadelphia 13, Pa. J-54032-A



Official representatives check film of individual passes—746.075, 761.414, 746.053 and 759.499 mph—to determine official average of the Westinghouse powered Douglas F4D.

YOU CAN BE SURE...IF IT'S
Westinghouse

cockpits and fail to observe the other aircraft.

As to a remedy, arguing about placing the blame is stimulating but so is a new stewardess; arguing about angles of convergence (at altitude or runway intersections) won't save lives. There is only one way to lick this problem and that is by vigilance—constant vigilance.

W. B. Young
5741 Colorado Ave., N. W.
Washington 11, D. C.

Praise

Please send 12 tearsheets of the article, "F-86D Flies with 'Automatic Engineer'," by Philip Klass, (Sept. 21, 1953).

We are continually pleased with the wealth of interesting information that appears in the pages of your fine magazine.

Barry J. Hawkins, Sales Promotion
Fairchild Camera and Instrument Corp.
Potentiometer Division
Hicksville, L. I., N. Y.

I read with great pleasure the article in Aviation Week of July 27 "French Fighter Takes Off From Dolly" describing the aircraft whose design and construction I was fortunate to direct [Le Baroudeur—Ed.] The article is very well written and presents the main qualities of the aircraft very accurately.

. . . The aircraft made its first flight on Aug. 1 and so far has about 12 hours' flying; the flight test results are very satisfactory.

W. J. Jakimiuk
Le Directeur des Etudes Speciales
Aeronautiques due Sud-Est
Societe Nationale de Constructions
Paris, France

We have just had an opportunity to review the article in your Aug. 3 issue entitled "Experts Learn to Live with Titanium." I would like to take this opportunity to advise you that I believe Mr. Stone has not only done a remarkable job of reporting but has presented a rather complex picture with an unusually high degree of accuracy. We would appreciate it if you would pass our congratulations along to Mr. Stone for a job well done.

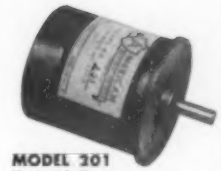
D. W. Kaufmann
Assistant Sales Manager
Rem-Cru Titanium, Inc.
Midland, Pa.

I was in London when one of my American friends handed me a copy of the Aug. 31 Aviation Week. I was very pleased to read the article regarding our company and I want to congratulate you on the manner in which you have been able to say so much in so few words.

A. Bandi, President
Aviation Electric Ltd.
200 Laurentien Boulevard
Montreal, P. Q., Canada

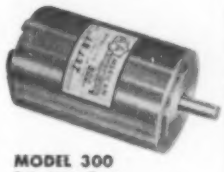
I was very pleased with the article, "Kit Combines Aileron and Rudder Controls" (Sept. 14, 1953). It is another example of excellent reporting, typical of Aviation Week.

I wish particularly to commend George Christian on his very clear and accurate



MODEL 201
Hysteresis Type
Synchronous Drive Motor

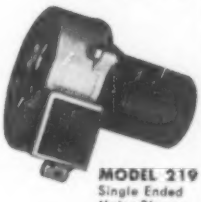
MODEL 228
Induction Drive Motor



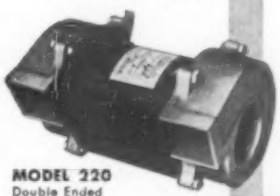
MODEL 300
Reluctance Type
Synchronous Drive Motor

MODEL 168
Propeller Fan

MODEL 182A
Axial Flow Fan



MODEL 219
Single Ended
Motor-Blower



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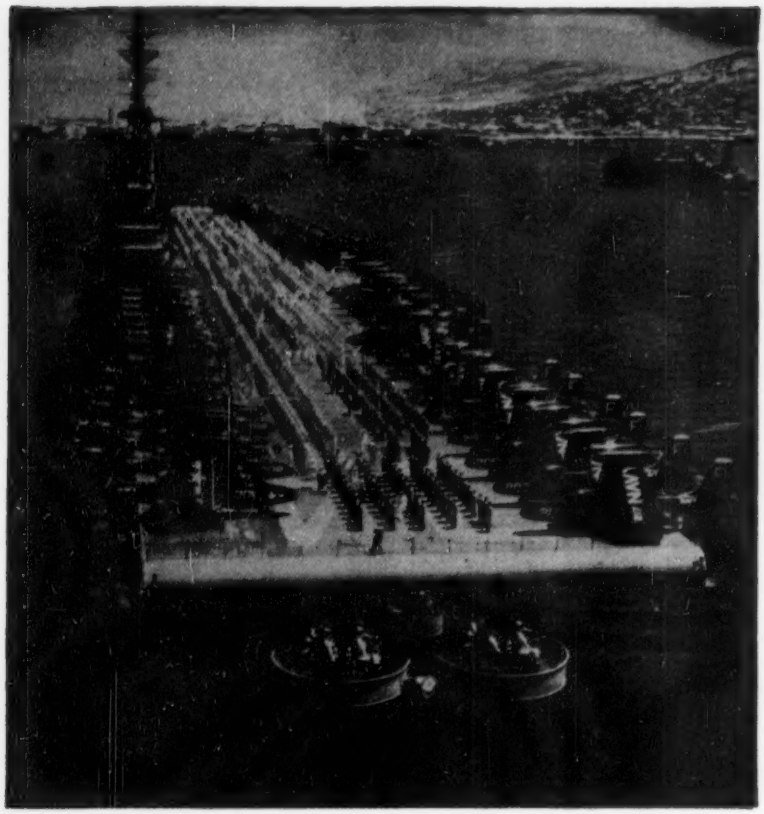

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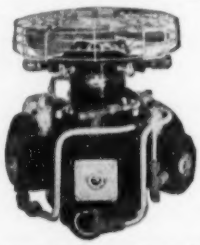

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presentation. The control system is about as difficult to explain as it is easy to fly. Mr. Christian has done a superb job.

F. W. Ross
Professor of Aeronautical Engineering
University of Detroit
Detroit, Mich.

'Turbo-Propaganda'

Some recent news stories in your magazine have suggested a significant shift to the turboprop engine as a better answer to future airline requirements than the turbojet.

For example, C. R. Smith, president of American Airlines, was quoted to that effect in your issue of May 11, p. 102. More recently (Aug. 24, p. 47), you have quoted Sir Miles Thomas, chairman of BOAC, as favouring the turboprop. All this turbo-propaganda is supposed to have cast a pall of gloom over the turbojetted transport protagonists, especially those on the West Coast.

As an eminent American aircraft designer has just pointed out, engineers in the business are once again called upon to go through more design exercises to show the relative merits of the two types of turbine.

It should be obvious by this time to airline operators (and yet apparently it is not) that the speed-altitude spectra are different for the turbojet and the turboprop. Broadly speaking, future passenger transportation lies in the higher and faster domain of the pure jet, while the turbined windmills will be harnessed for the carriage of cargo at lower speeds and altitudes. It's almost as simple as that!

What, however, is not so simple is the fact that it takes about seven years to design and develop a reliable turboprop. Kelly Johnson, chief engineer of Lockheed, has rightly pointed out that the turboprop is much more complex than the turbojet, since it has all the pure jet engine problems in the power section, a much more complex fuel system, and the further bugagoo of a big gearbox with highspeed shafting and a weighty propeller. This propeller, incidentally, involves a tricky starting and idling problem because of its high inertia and starting drag. On top of all this is the well-known fact that big propellers are still providing some big headaches.

But the clinching argument for the passenger and the turbojet is the over-the-weather comfort factor—as clearly evidenced by the official CAB listing of non-fatal casualties for piston-engined airliners on p. 55 of your Aug. 3 issue.

It is true, of course, that the turbopropped airliner will be able to fly higher than the pistoned transport, but it is still not high enough for weather comfort. It is an alarming experience to be thrown up to the ceiling while plowing through the troposphere in rough weather and those passengers who have experienced it are hardly likely to come back for more. They will either take a train or wait for the stratospheric jet.

S. E.

[S. E. is a British aviation writer who spends much time in the U. S.—Ed.]

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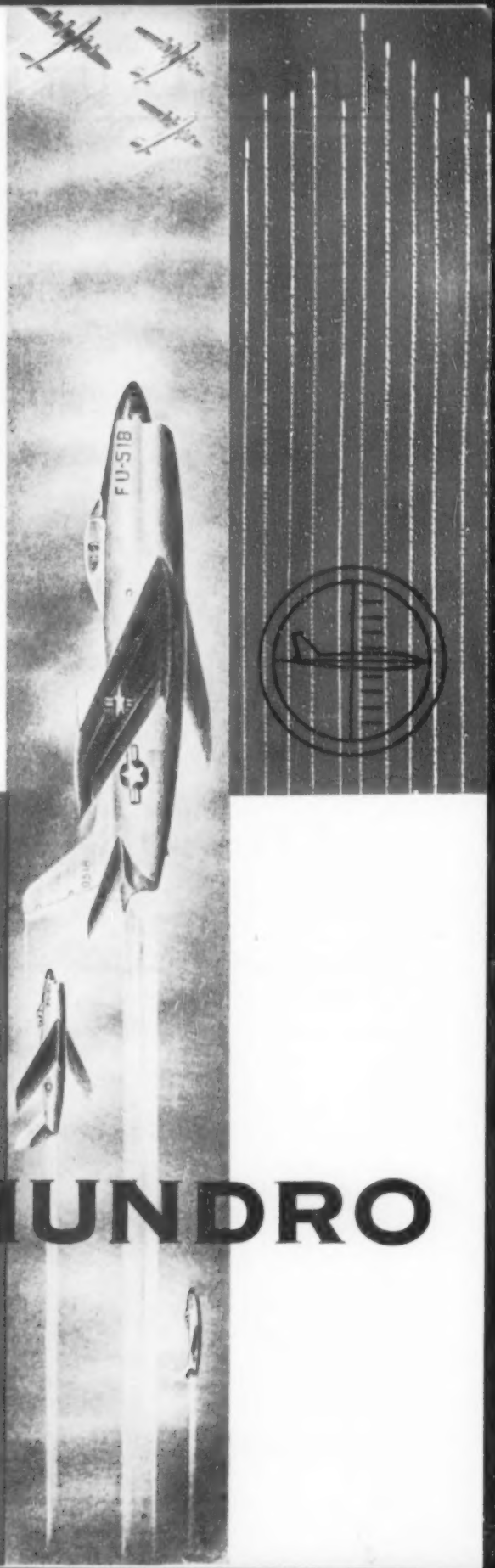

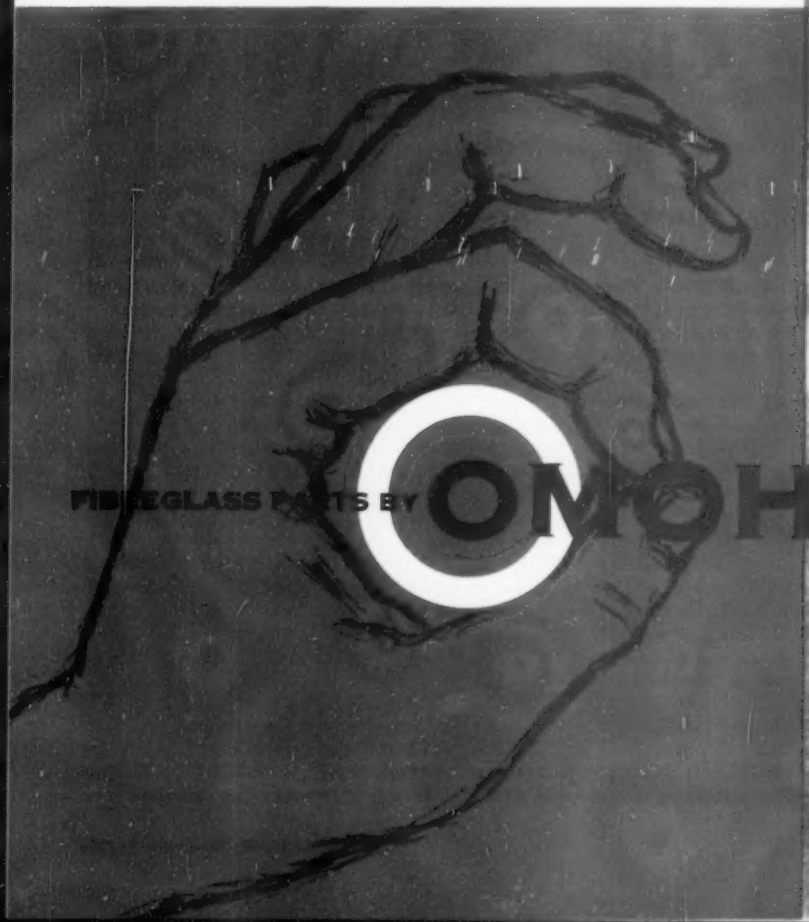

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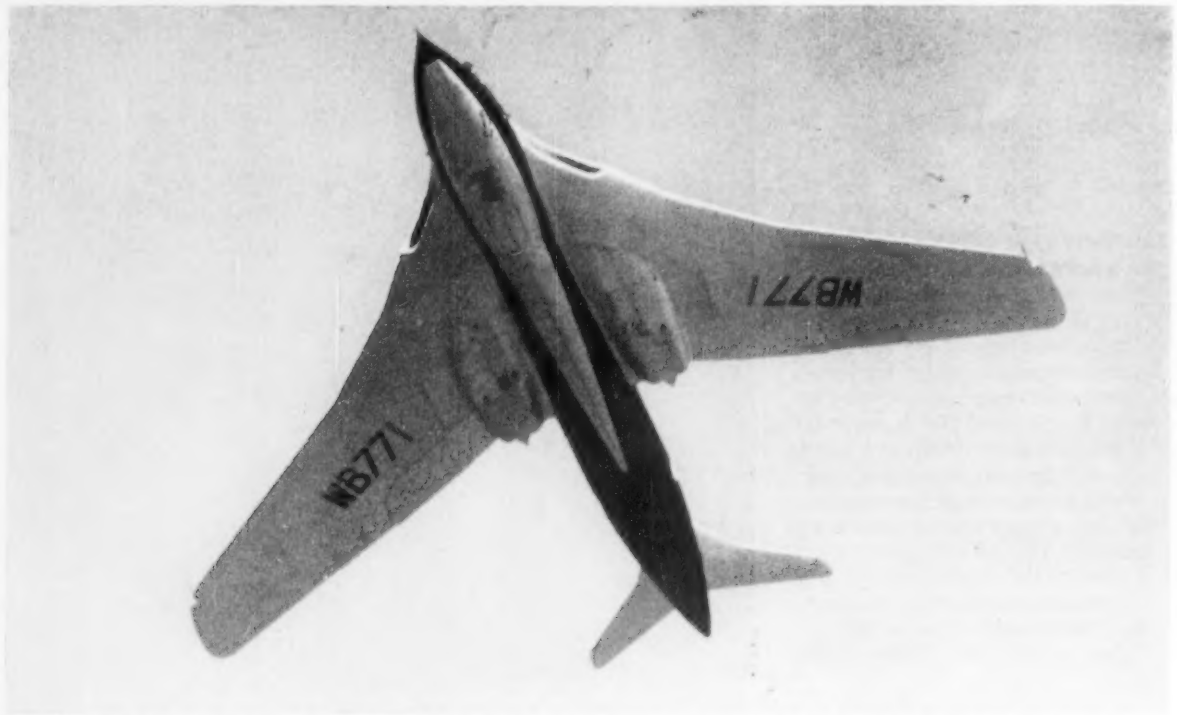


CRESCENT WING of the Handley Page Victor medium bomber shows to advantage in this belly shot taken at Farnborough.

Crescent-Wing A-Bomber Analyzed

By David A. Anderton

London—Half the future atomic capability of the RAF Bomber Command will ride on the crescent wings of Handley Page Victor.

The big bomber, now in super-priority production, is expected to share —with the delta-winged Avro Vulcan— the job of rapier retaliation should war come.

Planned to cruise at near-sonic speed and altitudes above 50,000 ft., the Victor and Vulcan represent two different design approaches to the same problem. On the other hand, the Vickers Valiant, designed to an earlier specification, is expected to draw a pathfinder role in the Bomber Command team.

Mighty Victor—as most of the Handley Page staff calls the plane— is completing its first year of flight-testing the radical new wing planform selected by technicians under chief designer R. S. Stafford.

In its recent public flight demonstration at the 1953 Society of British Aircraft Constructors flying display, Farnborough observers were impressed with the low-level highspeed runs, and the steepness of takeoff and landing paths.

▶ **Prized Planform**—Most of the credit for performance of the Victor is given to the crescent-wing layout, an aerodynamic form in which the angle of sweepback and the thickness/chord ratio decrease from wing root to tip.

At high speed, such a wing can have a constant critical Mach number from root to tip.

At low speed, such a wing can have reduced tendency to tip stall.

But these aerodynamic advantages are paid for in structural coin. A crescent wing is bound to be heavier than one with straight-line elements throughout.

▶ **Desperate Project**—So the Victor had to be engineered with great attention to detail design. Contours had to be held closely to maintain the aerodynamic performance, and weight had to be reduced wherever possible. To the Handley Page technical staff, the successful first flight on Christmas Eve, 1952, was the culmination of six years of tough work.

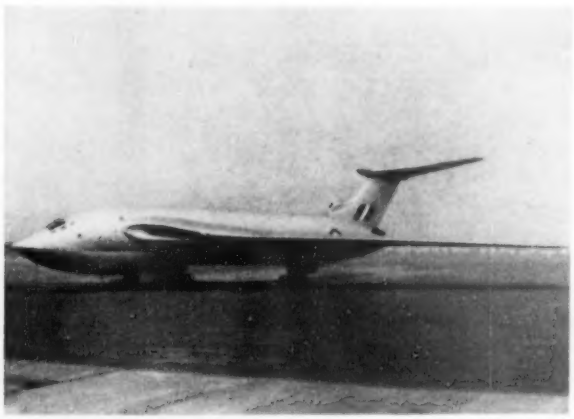
It was desperate work, according to

'Mighty Victor' Carries Handley Page's Hopes Aloft . . .

VICTOR shows gigantic air intakes in thick, highly swept root section. Root is joined to outer panels through a transition piece.

IN THE AIR, power controls make Victor easy to handle.

HIGH TAIL may appear in modified form in production version.



DOUBLE BUBBLE of Victor's forward fuselage is pressurized crew compartment for six, contains optical panels for bomb-aiming.

H.P.88 research plane was built to test crescent wing in flight, flew too little and too late, crashed after a few tests.

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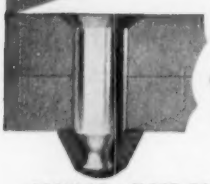

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HS 27 Close Tolerance 100° Countersunk Head—Close Tolerance Shank
HS 28 Flat Binding Head—Close Tolerance Shank
HS 37 Close Tolerance 100° Countersunk Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
HS 38 Flat Binding Head—Close Tolerance Shank—Minimum Tensile Strength 160,000 p.s.i.
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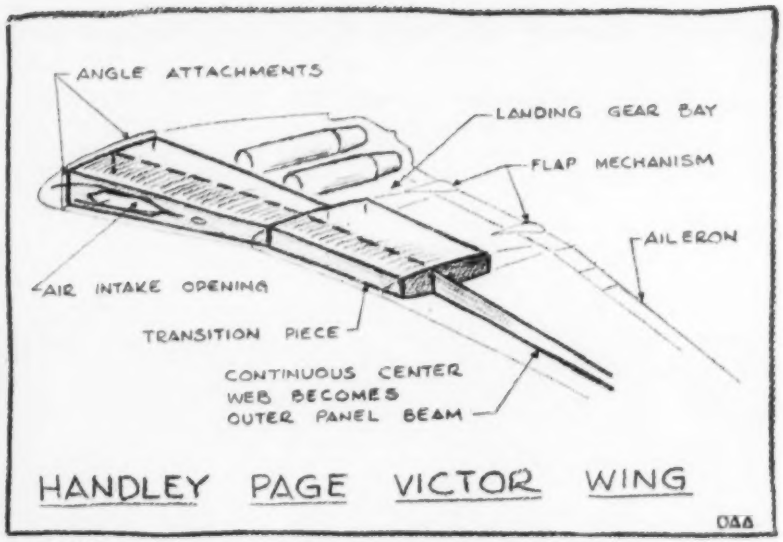


one British engineer. Cynical comments about the company had been making the rounds of British industry for several years. Their Marathon feederliners weren't up to expectations. The four-engined Hermes fleet of BOAC recently went on the block. One typical crack: "Handley Page hasn't built a good airplane since the Hannibal" (a biplane airliner that carved out empire routes of Imperial Airways, one of the forerunner companies to BOAC).

But those who saw the Victor perform at Farnborough came away with the feeling that Handley Page had passed off a miracle, and that it could mean a renaissance at the Cricklewood factory.

Here for the first time are the details of that "miracle" and the engineering labor behind it.

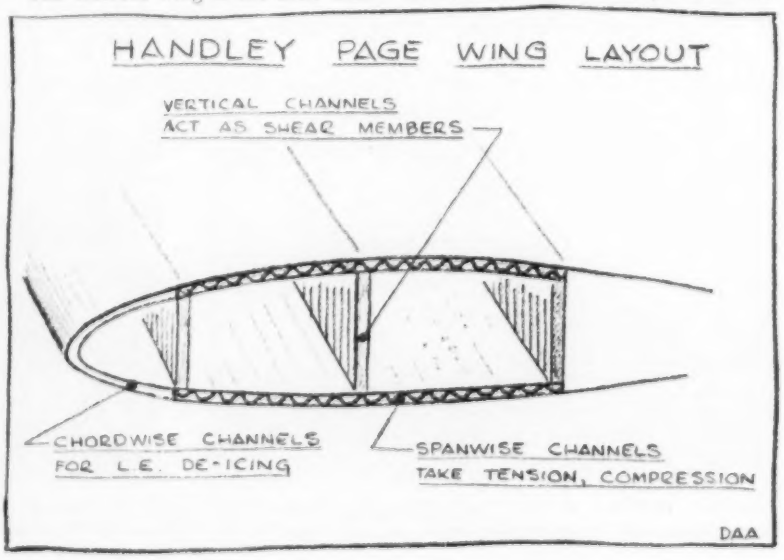
Aerodynamic Features

The crescent wing is the basic aerodynamic foundation on which the entire structure of the Victor has been built. The layout has been described earlier (AVIATION WEEK Nov. 17, 1952, p. 22); it had its genesis in the many last-minute research developments of the German aircraft industry during the closing days of World War II.

Arado and Blohm & Voss were two of the firms that experimented with a variety of wing shapes, including swept surfaces, M and W planforms, and one in which the idea of compensating sweep and thickness ratio was featured.

Handley Page seized the idea for the Victor in the early postwar years; but ironically, the British patent for the crescent wing is owned by George Edwards, Vickers-Armstrongs' aircraft division managing director and designer of the Vickers Valiant.

The Valiant wing, incidentally, is more of a "pure" crescent layout than that of the Victor. Leading edge of the Valiant is a smooth curve; on the Vic-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In addition, the company announces that Captain John W. King, US Navy (Retired) has joined it in helping to provide our Nation with better aircraft.

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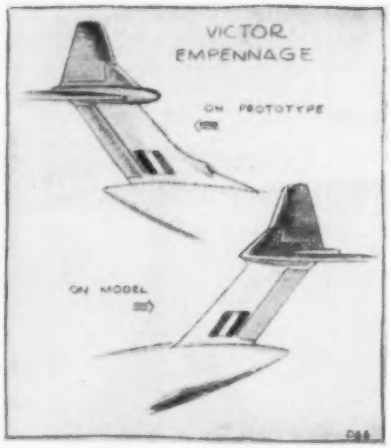


tor, it is made of three straight-line sections.

► **Section Functions**—The large sweep at the root of the Victor wing compensates for the speedup in airflow due to fuselage interference; the high thickness/chord ratio means that the engines can be buried—almost.

Outboard is a section with thickness taper and a reduced angle of incidence to form a transition piece between root and tip panels. This transition section apparently has a slight positive dihedral although both root and tip sections have negative dihedral.

The tip section is least swept—although more than in the case of the Vickers Valiant—but is the thinnest; a rough estimate would place the T/C ratio at about 6%.

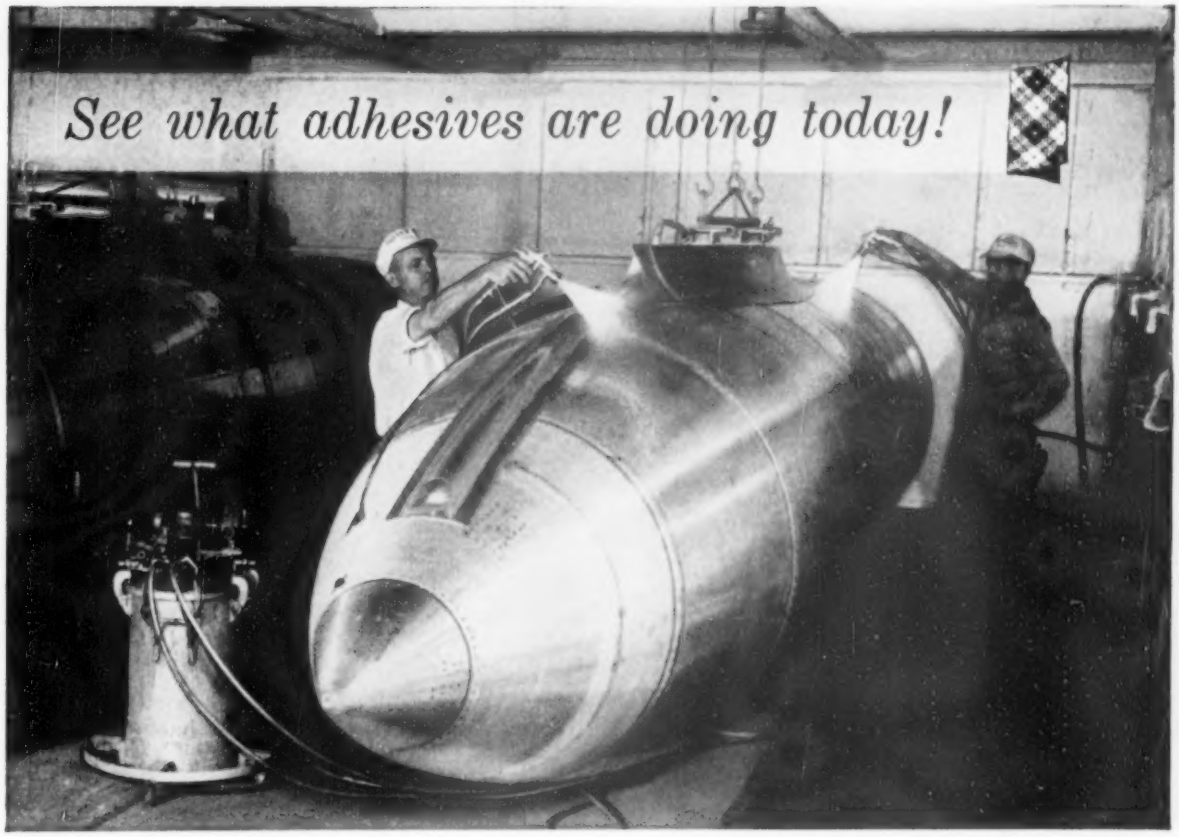
Leading edge of the outer panel incorporates droop-snoot flaps. These are divided spanwise so that the outer portion is about the same length as the aileron behind it. Inboard section droops at a greater down deflection than the outboard, where large wing-curvature increases might reduce control effectiveness.

► **Tail Layout**—The high Tee-tail of the Victor waved at Farnborough spectators during takeoff and landings, emphasizing the structural problems inherent in such a geometry and underscoring the display of a modified tail on a Victor model displayed on the company stand.

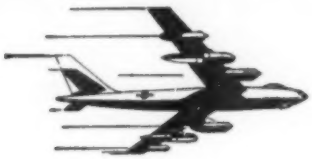
Leading edge of the horizontal tail is "cranked" twice, compared to the three-sectioned wing. Trailing edge is straight.

Stabilizer area is only about one-quarter of the entire surface, with the remaining three-quarters being elevator. About one-third of the elevator area is an aerodynamic leading-edge balance.

Mass-balance weights are located near the elevator tips, with a large area ahead of the hinge line. This is one of the "brute force" methods to avoid flutter, and is similar to that used by the Russians on the MiG-15, to name one



Giving fuel tanks the slip



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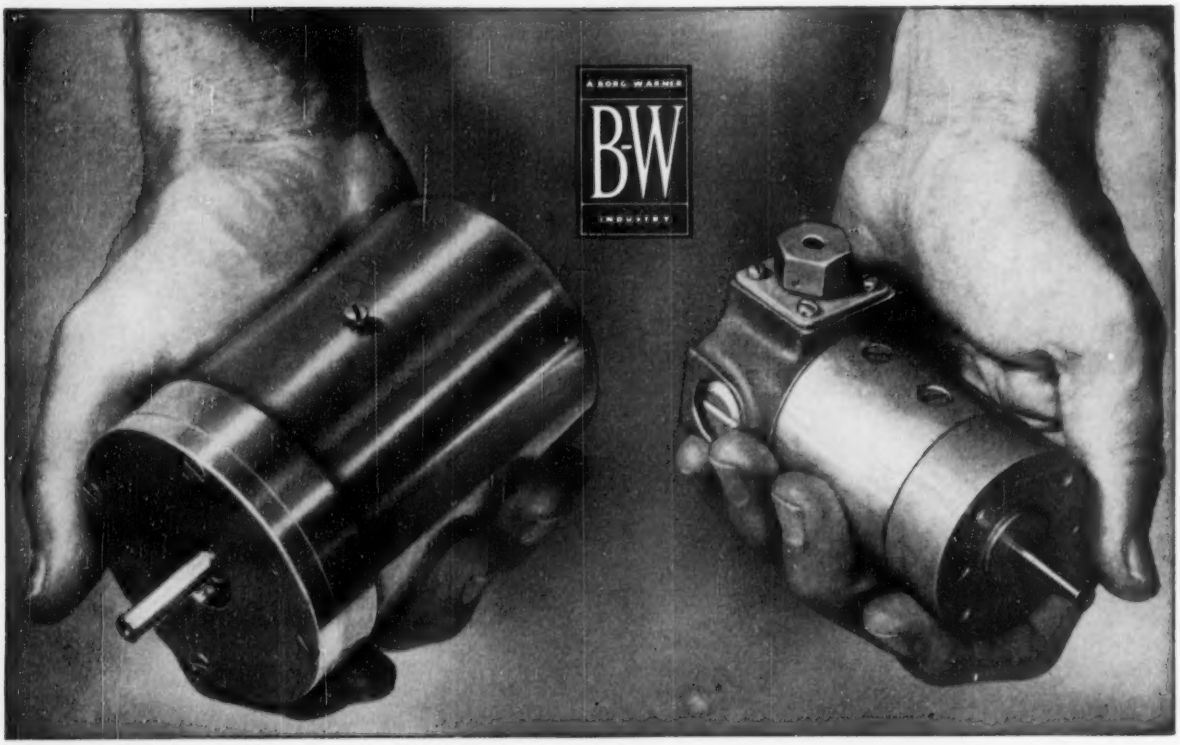

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other contemporary example of this type treatment.

The fin has a low aspect ratio to provide a more efficient structure. Lines of the vertical surface are marred by the dorsal fin and the large air intake for combustion heaters. Both these latter features are missing in the modified tail of the model.

The plastic fairing at the intersection of the surfaces—called the "acorn" in England—will be reduced in size if the model is a true indication.

▶**Fuselage Form**—The Victor has a jowled look from the underslung blister at the nose. This double-bubble section extends back to the beginning of the bomb bay and houses about six crew members.

The sloped nose is reported to be modified to a somewhat greater length for production and possibly a complete design change to the type of canopy in use on the Valiant and Vulcan will be made.

Lower nose has glass panels for bombing; the Victor is the only V-bomber so equipped in its current form.

Normal entry and exit is through a door in the upper portion of the port side of the bubble. For emergency exit, two hatches above the flight crew position jettison up and aft on hinges at the rear edge.

Aft of the double-bubble, the fuselage is conventionally elliptical and tapers to a sharp point. Rapid taper of the tailcone might indicate flow breakaway with resultant snaking at high speed.

Large fuselage airbrakes are fitted to the tailcone just below the vertical tail. Low fins are fitted to top and bottom of the brakes to control the flow when they are open, and to divert turbulent air from the rudder. When the brakes are fully open, you can see through the fuselage; there is no inner skin. Drag would appear to be high.

▶**Powerplants**—Four Armstrong Sidderley Sapphires rated at 8,300-lb. static sea level thrust provide the thrust for Victor's flight. Although classed as buried engines, actually the engine cowling protrudes somewhat above the wing, and considerably below it.

Between the jet tailpipes there is a separator to prevent turbulent mixing of the exhausts. Wing flaps follow the contour of the tailpipes.

Engine accessibility is from below; large panels can be removed to allow the Sapphires to be dropped out. With the airplane standing on the ground normally, the engine access panels can be reached by the average mechanic standing on a low stool.

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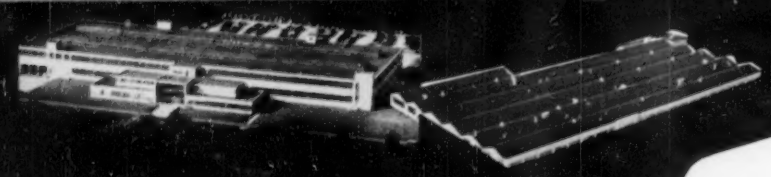
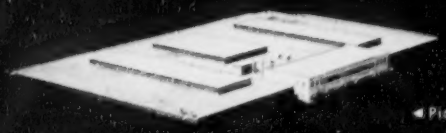


▲ Red Bank Division at Eatontown, N. J.



▲ Utica Division at Utica, N. Y.

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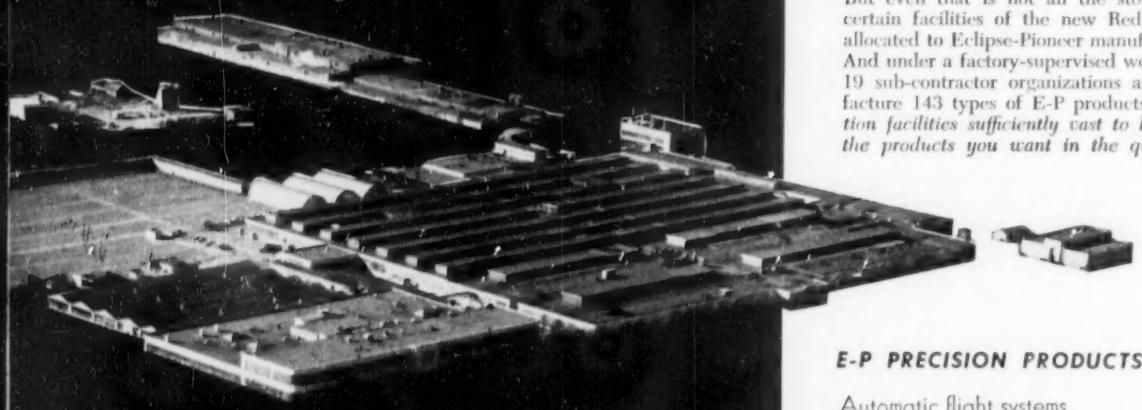

Eclipse-Pioneer Division at Teterboro, N. J.

37

That's the number of years we have been in the aviation business—the number of years we have devoted to the creation, development and manufacture of precision products for the aircraft industry. They are years in which we have consistently paced the field with developments of fundamental significance to the evolution of powered flight. *They represent a wealth of practical experience that can play an important role in your post-Korean plans!*

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That's the number of people available to serve you—skilled men and women who are designing, engineering, manufacturing and servicing the products that have developed Eclipse-Pioneer's standing as the world's largest producer of aviation instruments and accessories. *Here is massed manpower ready to satisfy your needs!*

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That's the number of square feet devoted exclusively to Eclipse-Pioneer's tremendous operation which, besides our Teterboro plant, includes the complete facilities of the Pioneer-Central and Utica Divisions. But even that is not all the story, for in addition, certain facilities of the new Red Bank Division are allocated to Eclipse-Pioneer manufacturing operations. And under a factory-supervised working arrangement, 19 sub-contractor organizations are tooled to manufacture 143 types of E-P products. *Here are production facilities sufficiently vast to be able to turn out the products you want in the quantities you need!*

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low-energy air is through louvers on the upper surface of the wing.

Structural Layout

No details have been released on the internal design of the giant Victor. But technical observers were quick to spot many structural specimens during the "open house" held last July at the dedication of the company's new test facilities. In mid-September the plant was again opened, this time to the delegates at the Anglo-American aeronautical conference.

Specimens on view included the fuselage and center-section spar in a structural test rig, a power control mockup, air-conditioning full-scale apparatus, half an elevator and a dynamic model of the airplane for simulation of structural resonance. In sight on the airfield was the full-scale model of the fuel system.

▶ **Inner Panels**—The root and transition sections are built around a heavy box spar of sandwich construction with corrugated metal core. Spar runs between the 10% and 40% chord stations, approximately.

Fittings on the rear web of the spar carry the landing gear and engines. Intake air for the powerplants is ducted through hexagonal openings in the spar webs.

Corrugations in the spar run vertically in the webs, and spanwise in the skins. A spanwise line of rivets suggested the presence of a third central web in the box, and a similar structure was exhibited at Farnborough as representative of the wing section on the H.P.R. 3 feederliner.

Aluminum alloy peripheral channels tie wing root and fuselage together through a bolted connection.

The smooth surface of the specimens and the Victor wing suggest that spot-welding has been used except where the skin is thick enough to permit countersinking. The inner skin is undoubtedly riveted.

With good automatic riveting and welding, the firm reasons that production will be cheaper than it would be if thick skin were machined to contour.

Factors weighing in this decision were the chances of having to scrap a large piece because of machining error, the amount of chip waste and the near-impossibility of repairing or correcting manufacturing error through repair.

▶ **Transition Section**—The basic structure of the transition piece between root and outer panels is the same as that of the root with one exception. In this piece, the wing spar extends farther aft to a chordwise station estimated at about 60%.

Construction of the outer panel is more likely to be multi-spar because of

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the extreme thinness of the wing.

Leading-edge sections carry direct aerodynamic loads only, and are built onto the spars in each panel. Most of the rear portion of the crescent wing carries aerodynamic loads also because the large cut-outs for wheels and engine access, plus the large slotted flaps and ailerons outboard, dictate such a structural plan.

Two fairings on the upper surface of the wing enclose the flap operating mechanism. The upper and lower surfaces of the wing are marred by splice or cover plates at the transition between each of the three panels, and also midway along the span of the outer panel.

▶ **Tail Structure**—The elevator is built with a wrap-around leading edge, a sandwich box spar and a sandwich trailing-edge section. The elevator hinge is a tubular spar which also appears to act as a distribution duct for hot-air leading-edge de-icing.

Fuel tanks are semi-circular in section and fill the fuselage above the wing. Since the fuselage under the wing is filled with bomb bay, and since the wings are too thin to hold much fuel, the chances are that drop tanks will be incorporated for supplemental fuel.

▶ **Heating and Ventilating**—Cold cabin air enters through flush inlets on either side of the fuselage nose, and hot air is bled from the compressor section of the engines. Conventional mixing units and heat exchangers are in the system to provide temperature control.

Individual ducts supply the bombardier in the nose, each pilot and his windshield panel, and the rear part of the cabin at the "second-floor" level.

Wing de-icing air apparently is taken in through tiny inlets just outboard of each engine intake. Louvers at the wingtips discharge the air after it has completed its run. Horizontal tail uses a similar layout and discharges at the tips. However, the inlet air is probably bled from the duct inlet on the dorsal fin.

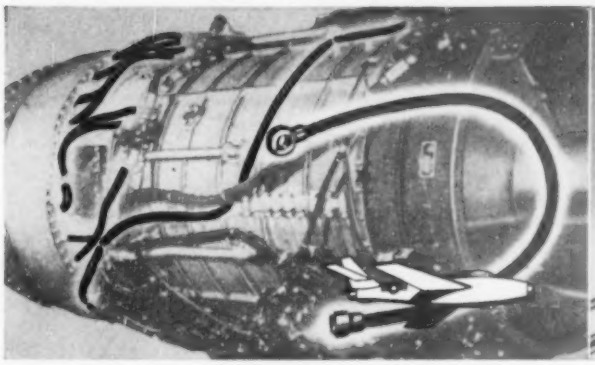
▶ **Control System**—Power controls of the Victor have been praised as light and pleasant. Push-rods move the controls, and run through roller bearings. Idler levers take care of spurious control motion that would be caused by wing deflection.

The system is claimed to overcome one of the objections to cable systems: the differential dimensions caused by thermal-capacity differences between steel cables and aluminum alloy structure.

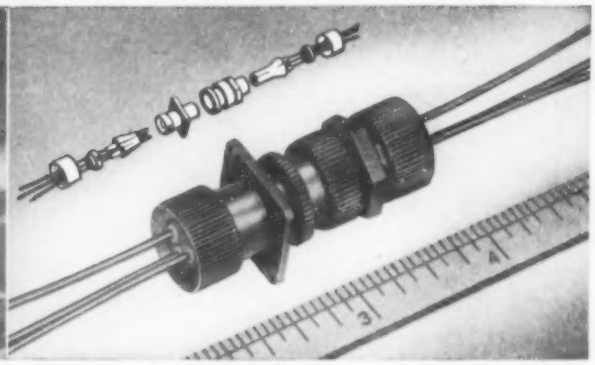
Controls are hydraulically operated, and a control "feel" unit is mounted near the pilots' control column.

The column is a new type, jointed above knee-level. It has a large handgrip with two radio switches and a brake lever. The design is an all-purpose

Four design ideas you can use right now...



DEPENDABLE FUEL FEEDING. Fuel for the J65 Turbojet Engine is injected to the burners through Titeflex® flexible metal hose. Tough, lightweight Titeflex—tested for temperatures from —70°F. to +600°F. and for pressures up to 500 psi—reliably conveys fuel to engine nozzles; withstands vibration and rough use; is excellent for complex configurations.



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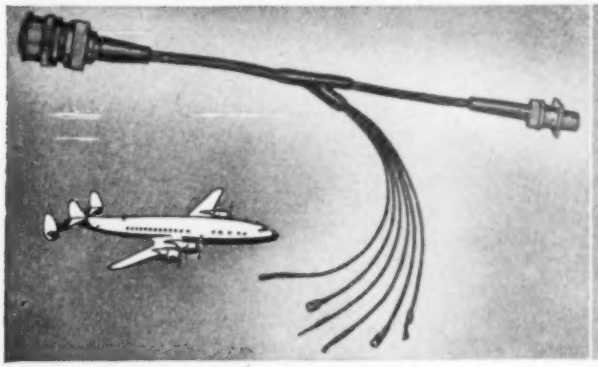
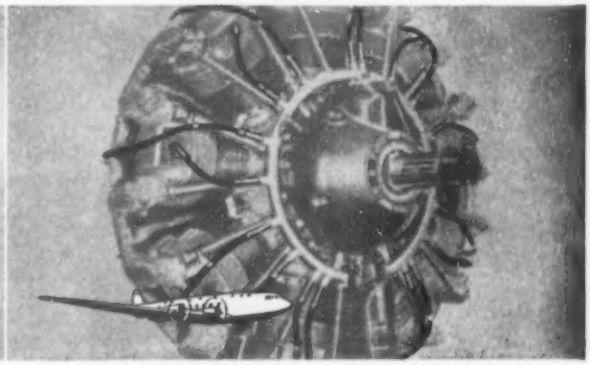


CUSTOM WIRING SYSTEMS. Titeflex specializes in designing and building special "packaged" wiring systems and component assemblies for today's complex aviation and guided missile installations. These may be jacketed with protective silicone or other compounds—and Titeflex Special Connectors used as integral parts solve complex wiring problems.



RADIO SHIELDING. Titeflex Harness for reciprocating engines is our specialty. Titeflex makes a wide range of standard ignition harnesses meeting rigid aviation specifications—can also supply component parts, such as serviceable leads for military and commercial aircraft. Titeflex application on Wright R 1820 Engine includes harness and leads.

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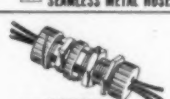

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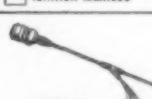

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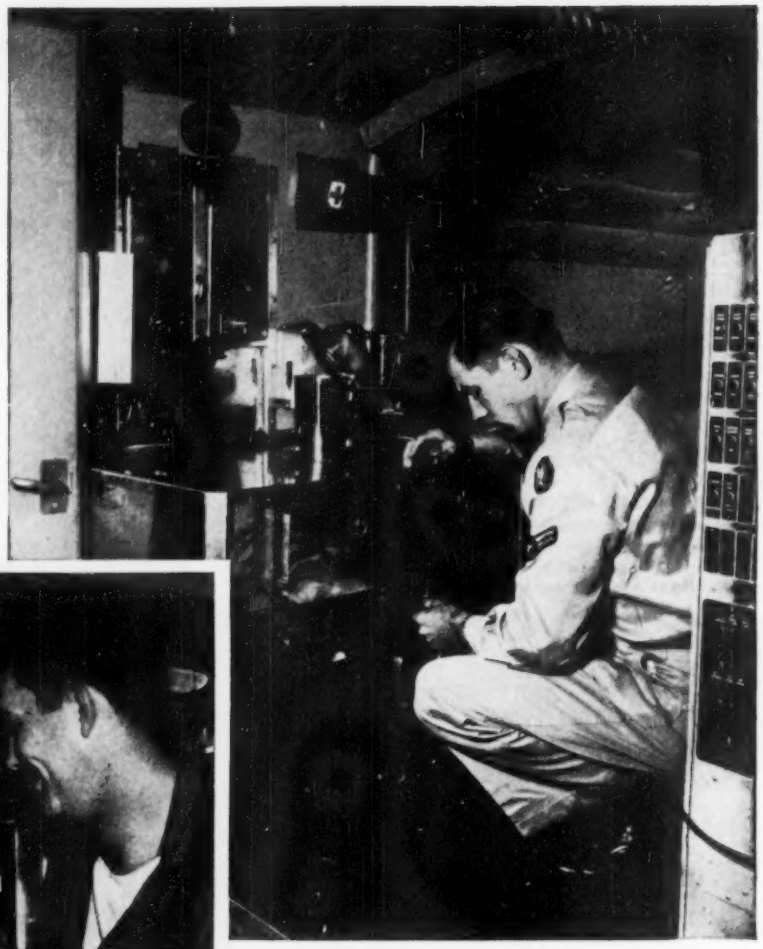

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unit which replaces the RAF standard spade grip for fighters and handwheel for bombers. The idea is to avoid any encumbrance when using an ejector seat.

▶ **Landing Gear**—The Victor rolls on 18 wheels—eight to each bogie and two on the nosewheel gear—supported by a landing gear designed by Electro-Hydraulics Ltd. Complete gear weighs only 3% of the gross weight of the airplane, considered by many engineers to be one of the lightest—if not the lightest—landing gears ever built.

The Victor is intended for the existing runways in Britain, and that meant the footprint pressure of the landing gear had to be low. But low pressure and high static weight meant a large number of tires, and the wing was rather thin to retract a bogie gear.

Supplementary design problems included:

- **Efficient braking.** This requires balancing the wheel loads so that each wheel can use its braking capacity to fullest effect.
- **Taxiing.** No porpoising tendency must develop during motion on the ground.
- **Ground maneuvering loads.** These are usually critical when the airplane has a high ratio of takeoff to landing weight. Turning the plane around one landing-gear bogie puts very high torque on the leg.
- **Pitching.** If the airplane pitches heavily onto its nose gear, it can develop high dynamic loads, and the reaction can feed the same kind of loads into the main gear.

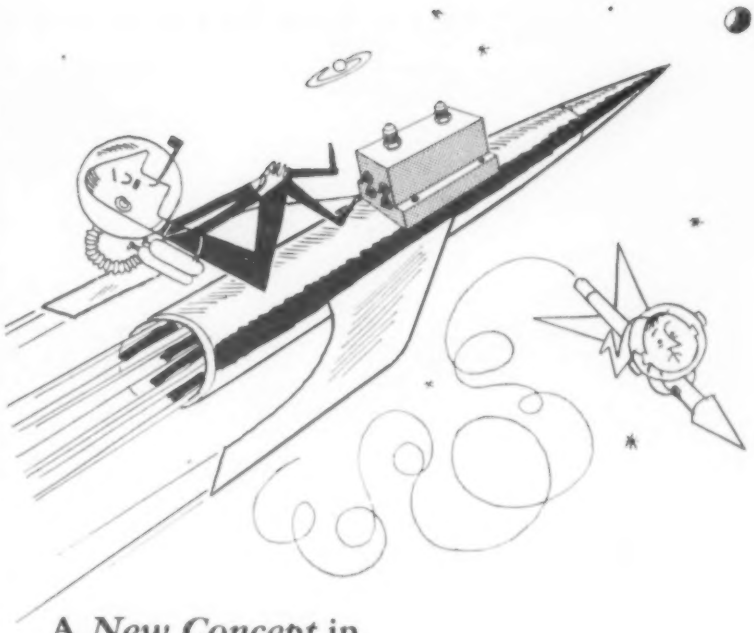
▶ **Main Gear**—Design of the main landing gear leg called for a balanced bogie with four wheels, each carrying two tires. The main strut is attached to the airplane structure through a toggle-action frame; a built-up radius arm extends from the main leg forward to a second attachment.

Two hydraulic cylinders, operating off the aircraft system at 4,000 psi., retract the leg. The forward cylinder closes to swing the radius arm up and aft; the rear cylinder extends to swing the toggle frame up and aft.

In the static position, the bogie is horizontal. Just before touchdown, in the so-called "free-air" position, the rear wheels dangle considerably below the front. After retraction, the bogie is again horizontal, but inverted as compared to the static position.

Landing loads are taken by the main leg, and by a dashpot which links the bogie to the main leg. At initial contact of the rear wheels in a normal (two-point) landing, the dashpot reaction builds up rapidly and the rear wheels are spinning before the front wheels have touched.

When all wheels are in contact, the main shock strut begins to work and



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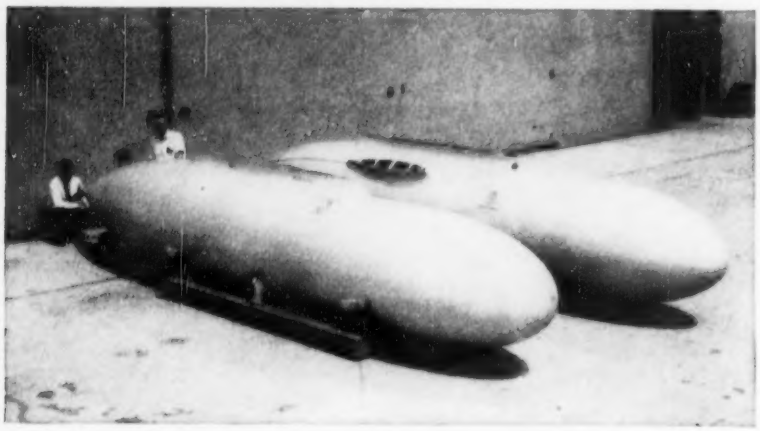

External fuel tank

fastenings designed to simplify field assembly and maintenance

These are the largest external fuel tanks ever designed and built for an aircraft—the Boeing B-47B jet bomber. Their design (by Ryan Aeronautical Company) incorporated the idea of a three section tank, with nose and tail sections to nest within the center section for shipping. A quick, sure method of fastening the three pieces together in the field was imperative.

ESNA® developed a special semicircular gang channel strip which provided a 38" bolt circle, enabling Ryan to quickly fasten the three sections together with ELASTIC STOP® nuts. The channels are riveted to the inside flanges at each end of the center section. In the field, bolts are simply drawn up in these prepositioned nuts to attach the nose and tail sections. The ELASTIC STOP nuts are self-locking, vibration-proof and reuseable. They are furnished with nylon locking inserts which are not subject to deterioration when immersed in fuel and which have specific service approval for use on jettisonable tanks. Ryan engineers report a considerable time and labor saving in fabrication of the tank, as well as in assembly and disassembly.

Look to ESNA for practical solutions to your current fastening problems—like this gang channel designed for Ryan.

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maximum reaction is developed while the front wheels are spinning up.

▶ **Nose Gear**—The nose undercarriage is a twin-wheel cantilever affair of conventional design. Retraction is up and aft by means of a single hydraulic cylinder which closes to "break" the drag link near the middle and fold it on itself.

Power steering through a range of plus and minus 45 deg. is incorporated in the nose gear, and free castering through plus or minus 90 deg. is possible.

During a tricycle landing, the dashpot on the main gear absorbs some of the vertical energy before the front bogie wheels touch. This absorption of some of the shock load by the main gear, coupled with negligible aircraft pitching produced by the landing, means that the nose gear has to absorb less energy than in a tricycle landing with nose and main gear touching down together.

Bogie porpoising is eliminated by high damping in the dashpot. On rough ground, the tendency is for the bogie to nose up and increase the load on the rear wheels. This prevents porpoising.

Flight Characteristics

Perhaps the best known of all the Victor's handling characteristics is the so-called "automatic" hands-off landing. The words are a misnomer, because the landing is neither automatic nor hands-off.

What it means is that the airplane can be trimmed for final approach in a four-degree glide path at about 120 mph., and from then until touchdown there is no further trim correction needed in pitch. Roll and yaw are handled in the usual manner. The throttles are closed at about 50 ft. altitude.

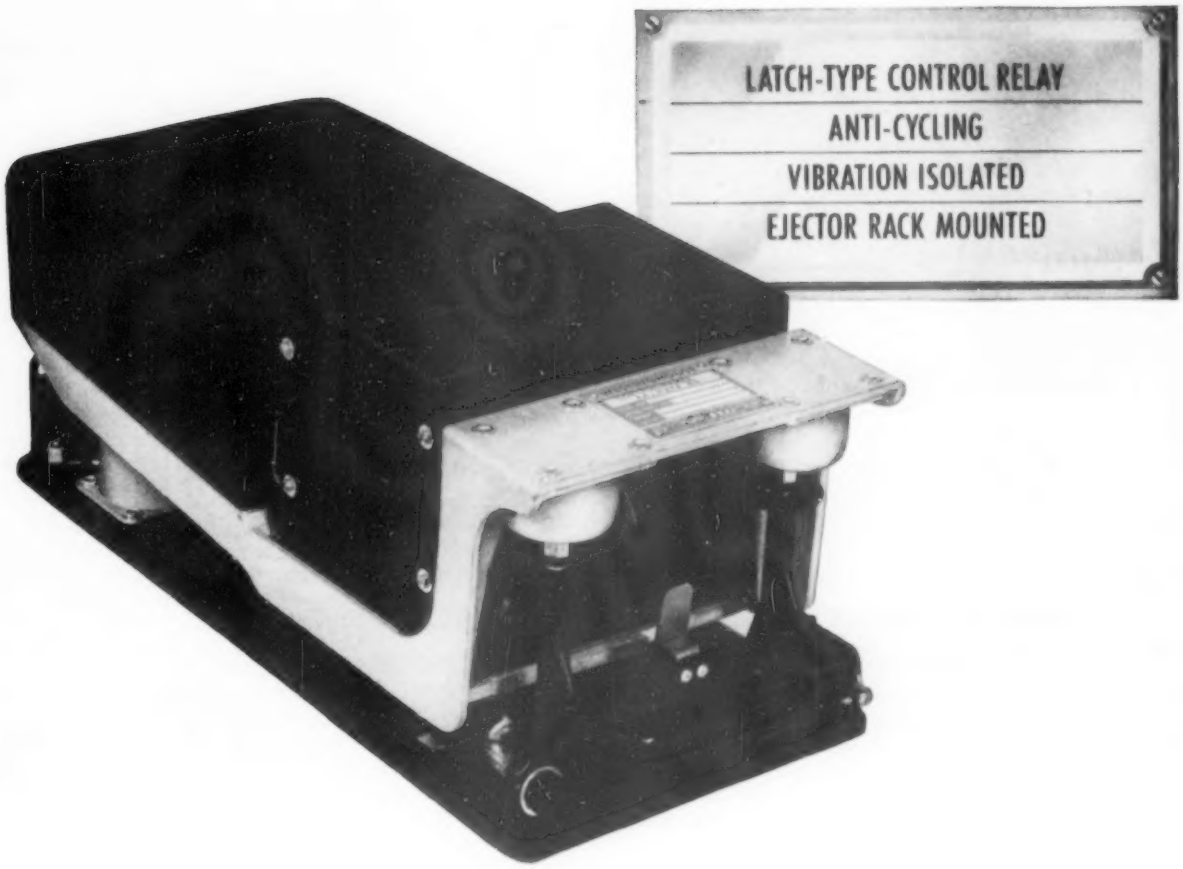
At about five feet, the ground cushion takes over and the airplane levels off to touch down lightly, with bogies hitting first.

As a matter of interest, the same procedure is possible with the delta-winged Avro Vulcan, but Handley Page made the claim first.

Takeoffs and landings of the craft were impressive, and foreign observers were surprised at the highspeed performance of the plane at low level.

Performance data are classified; but it is an open secret that the current medium bombers were designed to cruise at near-sonic speed—about Mach 0.9—at altitudes above 50,000 ft. Most stringent design requirement is imposed by geography, which limits future airplanes to existing runways all over the world.

As a result, the Victor—fully loaded for an operational mission—is probably



New Westinghouse Control Panel provides protection for 3-phase aircraft electrical power system

This new Westinghouse a-c generator control panel —total weight only 12 pounds—provides *positive* protection and continuity of service for any 115/200-volt, 3-phase aircraft electrical power system.

The panel's unfailing efficiency is due to the dependable operation of the following electrical components:

Generator control relay . . . differential protection relay . . . overvoltage relay . . . transformer-rectifier . . . field flashing circuit . . . power indicator relay . . . power selector rectifier . . . lockout relay.

All are built into a one-piece mounting base, which in turn is mounted on an ejector rack designed in strict accordance with USAF Drawing 52D 21558.

The main contacts of the latch-type (electrically or mechanically operated) trip-free generator control relay—a Westinghouse innovation—are enclosed in permanent magnet blowout arc chutes to assure positive arc interruption. Auxiliary contacts are available for closing or tripping the circuit breaker.

For further information on this new Westinghouse control panel or other aviation products, call your nearest Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-03013

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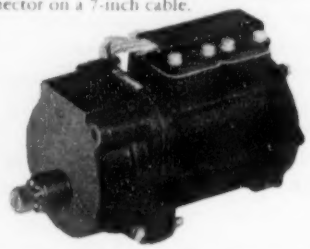
Accurately—that's the only way this rugged little operator knows how to perform. Heavy vibrations, pounding, tremendous heat, dust—*none of these* bothers the Honeywell MG13A Actuator Motor.

The MG13A is a small, lightweight motor for driving or accurately positioning small loads. It's designed to absorb hundreds of hours of punishment in a variety of uses—from driving gang potentiometers to operating digital counters. Although a rugged unit, the MG13A is designed for precision applications where high accuracy is required. Hunting and overshoot are eliminated by its built-in velocity signal generator.

We developed this Actuator Motor for our own use. Then so many of our customers realized they had *different* applications for it, now we want to be sure you know about it, too. Maybe you've got a rugged spot for the MG13A yourself! We'd be glad to give you more details . . . write Honeywell Aero Division, Dept. 401(AW), Minneapolis 13, Minnesota.

Specifications for MG13A Actuator

Description: The MG13A Actuator consists of a two-phase reversible induction motor, a velocity signal generator, and a 50 to 1 gear train, all contained in a two section housing. Electrical connections are provided by a Winchester type connector on a 7-inch cable.



Electrical Rating: Rated for operation on 240 volt A.C., two phase, 400 cps. It may also be operated on 208 volt A.C., single phase, 400 cps using a .08 uf capacitor in series with one of the windings.

Power Rating: The unit is rated at 1.4 inch-pounds of torque at stall.

Size: Approximately 2½" x 3" x 4¾".

Weight: 1 lb., 14 oz.

Environment: Tested in accordance with Mil-E-5272.

Performance: Delivers 1 inch-pound torque continuously.

Lubrication: No lubrication is necessary during its first 1000 hours.

Output Pinion: Four positions available.

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Aeronautical Controls

able to take off on a 7,000-ft. runway with space to spare. Its rate of climb-out after takeoff should provide ample margin for safe operation from airfields in hilly or congested areas.

Victor Evolution

Although exact dates are not available, by 1947 the Victor—or H.P. 80 as it was originally designated—was a fairly complete design study.

Enough work on the aerodynamics, weights and structures of the problem had been done to convince everybody that the goal was not unattainable. But in terms of current practice, the goal was a considerable jump away. To meet it, Handley Page had to design a bomber that would carry the same bomb load at twice the speed for twice the distance at twice the altitude.

The first studies planned an airplane not too much bigger than the Handley Page Hastings, a four-engined military transport with a span of about 113 ft. Powerplants were specified as four Metrovick F.4 turbojets, design-rated at 7,000 lb. thrust each.

The design team concluded that the crescent wing was the heart of the problem and built their plans around it. An official proposal to the Ministry of Supply led to a specification and finally an order for the plane.

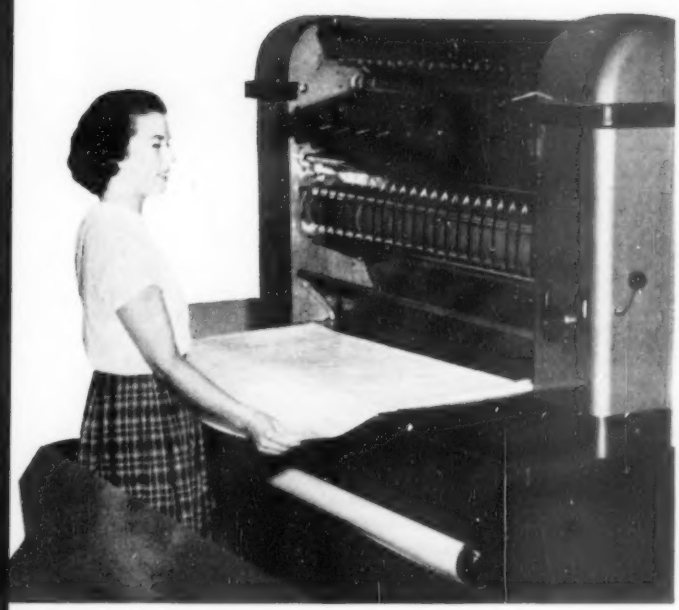
► **Busy Windtunnel**—Then the work of finalizing preliminary proposals began. Although Handley Page had its own windtunnel, this was capable of low speed only. The firm did a large portion of its tunnel work in its own lab, but had to resort to the highspeed tunnel at the Royal Aircraft Establishment, Farnborough, to get data at high subsonic speed. Time there was severely limited by the number of contractors

SUCTION PENDULUMS

Used in Navy's Chance Vought F7U-3 Cutlass, this Hycar rubber pendulum serves as the suction line in the aircraft's hydraulic reservoirs. It is designed and weighted so that it remains in the hydraulic fluid regardless of position or altitude. Product of B. F. Goodrich Chemical Co., unit is said to be resistant to deteriorating effects of hydraulic fluid.

Instead of starting all over again

...he begins here



Here's how the Lukens Steel Company, Coatesville, Pa., uses Kodagraph Autopositive Paper to eliminate retracing in preparing flow diagrams and piping layouts.

These diagrams and layouts must also show the floor plans and fixed equipment installations of the departments involved. But instead of retracing this information from the basic plant layout drawings, Lukens Steel simply reproduces the drawings on Kodagraph Autopositive Paper – gets *positive, photographic* duplicate tracings directly.

This gives the draftsman a tremendous head start . . . for he only has to add the new detail to the Autopositive print . . . *and another job is done instead of being barely begun.*

Low-cost Autopositive reproductions are made this easily at Lukens Steel:

Kodagraph Autopositive Paper is exposed with the drawings in a direct-process machine . . . and processed in standard photographic solutions. A fast, convenient room-light operation that produces positive photographic intermediates *without a negative step . . . without a darkroom.* These intermediates, in turn, assure highly legible prints.

Lukens Steel Company also uses Kodagraph Autopositive Paper *to produce print-making masters* from vendor blueprints; *to simplify filing,* by combining small vendor drawings on Autopositive intermediates in the standard Lukens drawing size; *to get low-cost protection* for original drawings which must be sent out of the plant.

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AC's ability to adapt automotive engineering and manufacturing methods to defense production has been proven again and again to be the solution to delivering top-quality material to the Armed Forces—on or ahead of schedule—at assembly line savings.

AC SPARK PLUG DIVISION GM GENERAL MOTORS CORPORATION

who wanted to use this, the only high-speed tunnel in England.

Most of the aeroelastic data problems were tackled by computational techniques, supplemented by windtunnel work. Flow rigs were set up and tested to develop the internal aerodynamics of the plane.

Outside on the apron, work was progressing on a huge structural steel frame which would contain the full-scale fuel tanks in proper relative positions. The whole test apparatus was designed to move to simulate aircraft attitudes for extensive ground tests of the fuel system.

▶ **Structural Worries**—The highspeed requirement for the Victor meant that contours had to be held closely and stay smooth under load. Overriding this was the insistent demand for structural stiffness near sonic speed.

The structures group worked out the low-weight structure described earlier, and test specimens were built and destroyed to prove out the design.

While all this was going on, Metrovick's engine work on the F.4 had been taken over by Armstrong Siddeley as the basis of the engine to be called the Sapphire.

Early Sapphires were flight-tested in the outboard nacelles of a modified Hastings and considerable experience with the engine characteristics was obtained this way.

▶ **Scale Wings**—Handley Page technicians believed that a flying model of the crescent wing would round out the test and computed results. Around a Vickers Attacker fuselage they designed a set of crescent wings and a new tail unit. The resulting research plane, the H.P.88, was built by Blackburn and General Aircraft.

Delays in the development of this flying model kept it from the air until the middle of 1951, by which time the Victor shape had been committed. The H.P. went into its flight test program anyway, but not for long. Within a few weeks after its first flight, the plane crashed, killing the test pilot. Reports said that it broke up during a highspeed pass acrosss the field after a series of test runs.

▶ **For Assembly**—After major components of the plane had been built at the Handley Page plant, they were to be taken to Boscombe Down for final assembly. In June 1952 the fuselage, disguised as a boat hull, was moved from the factory at Cricklewood, just five miles from the center of London, to Boscombe by truck.

For security, the canvas draperies over the "hull" were stenciled; according to the sign, the Geleypandhy was being consigned to Southampton. But Southampton was the wrong address, even though Geleypandhy was an anagram of the Handley Page name.

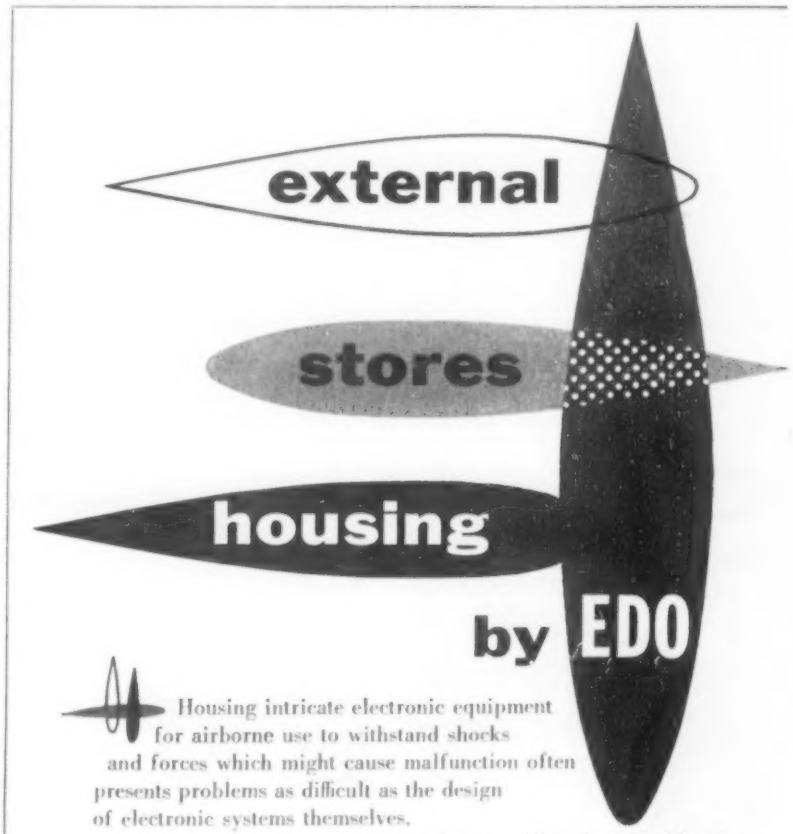
The big plane missed the 1952 Farnborough display in spite of all the extra effort made by the assembly crew. Shortly after, Victor was damaged by a fire which broke out during a test of the hydraulic system at the rear of the fuselage.

By mid-December, the plane was about ready for flight. One week before Christmas it was taxied out for compass-swinging, and a couple of days later, it was tested in highspeed taxi runs in a driving rain.

Bad weather continued until last Christmas Eve, when the clouds broke and the sun shone through. Under bright skies and with visibility up to 20 miles, Sqdn. Ldr. H. G. Hazelden, chief pilot for Handley Page, eased the Victor off the ground and into a circuit of the field for its first flight.

Since then, the big plane has been completing its flight-test program, flying as many as six times a day in extensive evaluation. It has been flown by "guest" pilots, seen by the public at Farnborough this year, and examined by a legion of visitors.

▶ **Footnote**—Definitely a dark horse in the British bomber program, the Victor is the critical airplane for Handley Page. If the plane is as good as the advance claims say, then the company is guaranteed a vigorous life for at least



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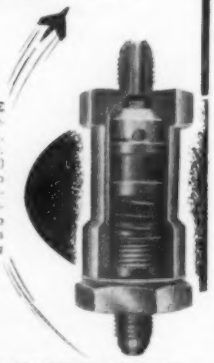

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another decade, industry observers say.

Outside of causing technical bewilderment at first glance, only one criticism has been directed against Victor, and that was more against the government policy that permitted three medium bombers to get into simultaneous production.

But Duncan Sandys, Minister of Supply, had this to say in rejoinder: "I welcome the appearance in the air of the Victor, for which production orders were placed some months ago without waiting for its first flight. This latest newcomer completes the present series of jet bombers with which the RAF is to be equipped. . . . In equipping an air force it is, as in racing, risky to put all your money on one horse. . . . As experience of the last war showed, there is great advantage in having several types of aircraft in service. In due course a final selection can if necessary be made based . . . upon the evidence of practical performance."

GE Building Lab for Combustion Studies

Basic studies of combustion phenomena will be the major job of the new $1.8-million laboratory being built by the General Electric Co. at its research laboratory site at the Knolls, near Schenectady, N. Y.

The new unit, to be part of the research lab's chemistry department, will be directed by A. J. Nerad, head of the mechanical investigation section and combustion consultant for many General Electric's developments. Three air compressors and a preheater will furnish the air supply for the lab; they will feed the combustion test cell and other portions of the test facility.

In the test cell, studies will be made of the dynamics of mixing gases, flame stabilization and flame speeds. Ideas for flame stabilization—one example would be the flameholder in a turbojet afterburner or a ramjet—will be tested. Similarity principles by which a huge burner can be tested in model form will be developed in this test cell.

Turbine bucket fatigue tests will be made in a section of the new building. Single stationary buckets will be blasted by pulsed hot air to study vibration and fatigue problems.

A highspeed pit for turbine rotor whirl tests, and a shock tube, to study the basic properties of shock waves and their propagation, will be housed in the facility.

The test units were planned by George Mullaney, and Drs. Donald White and George Moore. The building will be one and one-half stories high and contain 14,200 sq. ft. of floor space. Completion date is late 1954.

F-89D Scorpion

America's most heavily armed all-weather fighter

Flying at altitudes above 45,000 feet the F-89D Scorpion can unleash a "grand slam" barrage of more than 100 deadly air-to-air 2.75 inch FFAR rockets capable of downing the largest bomber with a single hit.

Wing-tip pods provide two sources of firepower and do not interfere with the vision of the pilot and radar observer. Advanced electronic aiming and automatic triggering enables the two-man crew to intercept invading aircraft in any kind of weather.

The USAF Northrop Scorpion is powered by two Allison turbojets which push it along at speeds in the 600-mph class. It has a gross weight, including a full complement of fuel and armament of more than 40,000 pounds.

Inco Nickel and Inco Nickel Alloys are used in many parts that are essential to the successful operation of the Scorpion.

You'll find Nickel and the Inco Nickel Alloys used where unusual combinations of corrosion resistance, heat resistance, strength and ductility are called for.

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Douglas Testing New DC-6 Wing Flaps

A new set of wing flaps for the DC-6 family of aircraft is currently being flight tested by the Douglas Aircraft Co.

Called the Five-Bar-Linkage Flap, new unit's purpose is to improve low-speed handling characteristics and cut down somewhat on over-the-fence and landing speeds.

Two improvements in the new flap system are a different linkage arrangement and a shutter or door on the wing's trailing edge. Linkage will permit flaps to extend further aft of the wing and shutters will close up and fair the wing trailing edge which is exposed when flaps are lowered. This will clean up airflow between wing and flap.

Weight increase of the new units will be negligible, it is stated. Price has not yet been determined. But, since rework of wing trailing edge is fairly extensive, cost of modification will probably not be cheap.

New flaps will be made to retrofit on the DC-6 family and the DC-7.

Turbulence Origin Studied

A new research program to locate the origin of turbulence in fluid flow is being conducted by Dr. R. Paul Harrington, head of the Department of Aeronautical Engineering at Rensselaer Polytechnic Institute, Troy, N. Y.

The study is to devise a method to locate experimentally the origin of turbulent flow either in pipes, channels or free surfaces. Once developed, the method will be used to check theories of the mechanism of turbulence in shearing flows.

Under terms of a contract with the Office of Scientific Research, Air Research and Development Command, USAF, the study is scheduled for completion in May 1954.

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FREE FLOATING

Crouse-Hinds Automatic Wind Tee serves as a continuous day and night indicator of wind direction or preferred landing direction. This tee gives you three different settings which the operator may select by remote control from the tower.

1. Operator Control: The tee may be rotated during low wind periods to the desired position by the rotation switch on the control panel located in the control tower.

2. No-Wind Return: During low wind periods the tee is automatically driven to the predetermined no-wind position ... the preferred landing direction, usually the longest runway.

3. Free Floating: The tee can be made free floating, responding only to the flow of air, by a switch on the control panel.

The control panel provides switches for controlling the tee operation. The panel also includes the selsyn position indicator which shows the actual position of the tee at all times.

A standard **Free Floating Wind Tee** without the remote control feature can also be furnished.

Tetrahedron conversion: Existing tetrahedrons can be easily converted to wind tees by installing Crouse-Hinds Type WT body on the tetrahedron base.

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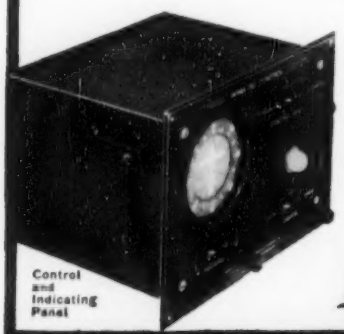

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THRUST & DRAG

Notes on the Need for Windtunnels: Boeing Airplane Co. has passed along the word that development of the B-52 Stratofortress wing required almost 8,000 hr. of windtunnel study. That's just about 11 months of continuous 24-hr. testing. Work began about four years ago on the wing design, and was recently completed—if any part of any airplane is ever completely developed—by flight-test observation of tufts on the wings.

Boeing operates and owns its windtunnel, and recently modified the unit at a cost of $1.6-million (AVIATION WEEK June 29, p. 36).

* * *

Note on the Need for Aeronautical Engineers: The entering class at Massachusetts Institute of Technology this year made aeronautical engineering its fifth choice, after electrical, chemical and mechanical engineering and physics in that order. Only 64 entering frosh—less than 8%—elected AE. Normal attrition might account for a loss as high as 50% out of this group by graduation.

This year's entering class is 10% smaller than last year's; the total is 843 freshmen. To compensate a little, 1,924 graduate students enrolled to make that body the largest in the history of MIT.

So get your personnel people up to Cambridge soon; there are only going to be 32 aeronautical engineers available there in the class of '57.

* * *

On final approach while riding in a Douglas DC-4 of early vintage, a Rolls-Royce service rep tapped my shoulder and directed my glance out the window to the extended, oil-streaked flaps. "Never saw oil-cooled flaps before," he said innocently.

* * *

"The better your engines, the lower your aspect ratio can be," says a top British designer. He goes on to point out that, like all generalities, this is

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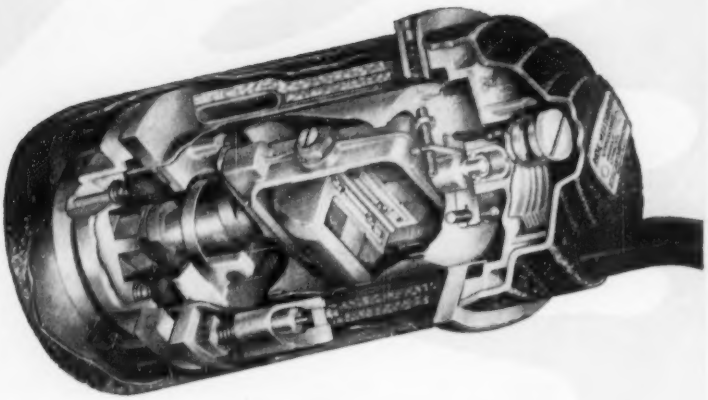

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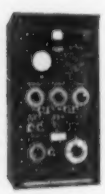

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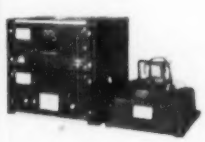


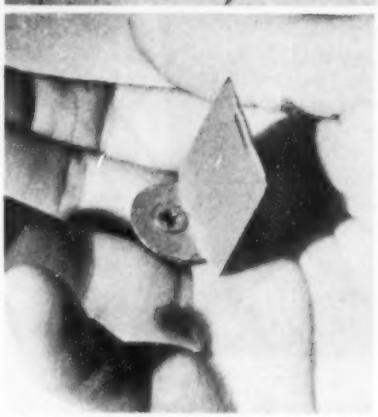
MARG-100 ANGULAR RATE TURNTABLE to generate rates in discrete steps for the calibration of Rate Gyros.

subject to interpretation and contradiction. But he feels that it does represent a fairly accurate statement of the airplane design problem.

As extreme examples, he cites the sailplane—with no engine and a terrific aspect ratio—and the missile—with all the power in the world and no wings to speak of.

* * *

Most unlikely use of a Hispano Tay turbojet—rated at 6,250 lb.—is an automobile. Yet at the recent 40th Salon d'Automobile in Paris, there was a turtlish plywood sport car which, according to my translation of the French sign, is a prototype for a second model to be built and Tay-powered. I'd like to watch the first road test. —DAA



B-47 VORTEX GENERATORS

Highspeed stability of the Boeing B-47 sweptwing jet bomber has been improved by the addition of vortex generators, tiny steel wings projecting from the upper surface of the wing. Each surface, set at a high angle of attack relative to the airflow over the wing, generates a vortex downstream. Purpose is to re-energize the low-energy separated boundary layer air to make it re-attach to the wing and thus establish better flow conditions. Stability, control and even drag improvements can result from the use of these tiny airfoil sections.

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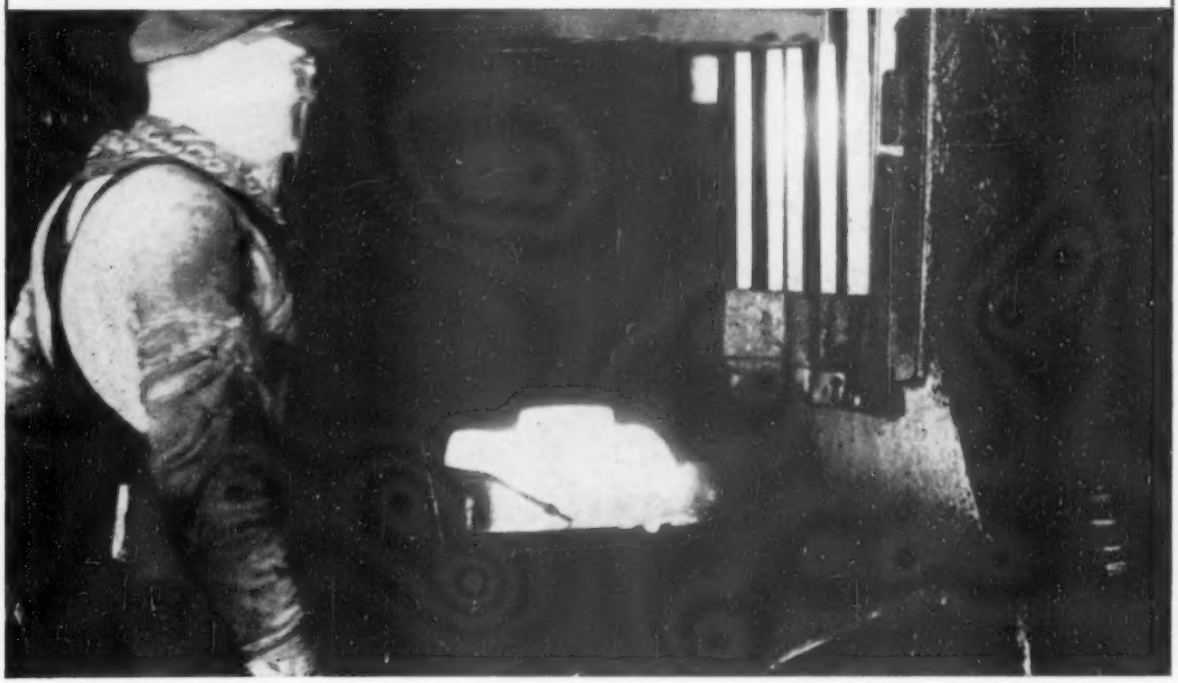

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Timken forging steels give you uniform physical properties. They respond uniformly to heat treatment—from bar to bar and heat to heat. Fewer furnace adjustments are needed. And Timken forging steels have uniform grain size after heat treatment. Result: your forgings have uniformly high ductility and resistance to impact.

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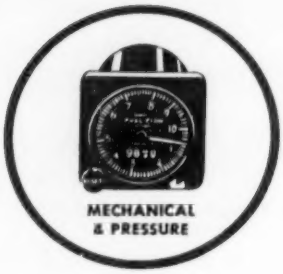
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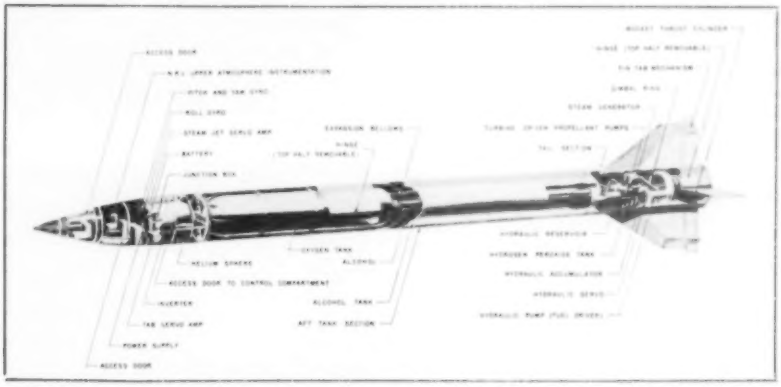


VIKING MISSILE design has been changed since this early view was released. Oxidizer tank is now integral, and fins are triangular, instead of as shown.

Production Study of Martin Viking

Analysis points out how research missile could be adapted for weapon use and high production rate.

By Irving Stone

About 10 Martin Viking missiles have been built, with four more scheduled. While the craft is strictly a research vehicle, its performance indicates that it could be converted into an effective, medium-range, ground-to-ground, tactical or strategic weapon.

Study of the Viking points up the many differences between a hand-built experimental job and a missile designed for production. Some of these changes are dictated merely by the change in function, from a testing device to a destructive device. Most changes would be the result of preparing the missile for large-quantity output.

Built for the Naval Research Laboratory, the Viking design was laid down in 1946-1948. It was designed in keeping with the state of the art in that period, and in that sense represents a development product.

Viking's specific missions—to investigate the character of the upper atmosphere and to advance the state of the rocket art—dictated certain performance requirements. The problems involved in meeting these requirements, rather than the production aspects, were the controlling factors in the missile's design.

▶ **Nose Considerations**—One example of how mission of the rocket has dictated design is the Viking's nose. Because of the instrumentation it has to carry in this area, the nose has been made pressure-tight—three formed sections seam-welded together. A sealed nose-base-splice gives access to the installation.

Instruments not requiring sea-level pressure are housed aft of the nose in an unsealed compartment. Conventional riveted makeup is used here—four formed skins attached to frames and stringers. It is in this section that plywood bulkheads and partitions are used for attaching instrumentation.

In a tactical or strategic application, the entire nose would be replaced by a warhead, which would dictate the type of construction, and the need for sealing, if any. Many variations might be involved here. The nose could merely be a cover to give the warhead form or it could necessitate special construction to accommodate special details.

▶ **Tank Details**—The body of the missile is a large tank area. The fuel tank is an integral installation whose shell is the missile's skin. This feature would be carried over to a production version.

The fuel tank is divided into two cylindrical sections each welded longitudinally, and circumferentially to each other. Welded bulkheads seal the fuel tank ends. The welding procedure is done by hand, whereas in a production model, machine welding would be used.

The oxidizer tank, located ahead of the fuel tank area, originally was not integral with the skin, but a separate, contained unit. It was felt that in an integral scheme the extreme cold imposed by the oxidizer might set up contraction stresses in the splice of the oxidizer section to the adjacent surfaces. Also, a separate tank was considered better to prevent oxidizer boil-off.

These precautions have been found unnecessary and the missile now incorporates an integral oxidizer tank for simplification and performance improvement through weight elimination. Undoubtedly, the simplification factor alone would justify this approach for high-rate production.

▶ **Pressure Vessel**—The pressurizing gas (helium) sphere now used is steel, but in a production version probably could be made up in a lighter configuration, such as tubes around the inside of the missile shell, although the sphere is as practical as any other configuration so far as shape is concerned.

Actually, the pressure vessel might not be necessary at all, since today there are other means available for supplying pressure to the propellant.

▶ **Package Idea**—In a redesign for production, improvement in the pump and thrust-cylinder combination might be made to afford a powerplant package arrangement on a truss support for easier replaceability.

Now, the major powerplant components are mounted individually and the basic tail structure is required to carry the loads. In the truss-package arrangement, a bulkhead could be used to carry the package, and the aft skin would serve merely as cowling.

Propellant piping connections now are the standard bolt and flange type. These probably could be changed, with favorable results, to a flexible-type joint. This not only would facilitate removal of components for replacement, but would also simplify piping-alignment problems.

▶ **Fin Possibilities**—Fins, now triangle-shaped, are made essentially by hand. Makeup comprises single-spar construction, with leading and trailing edges of conventional rib and skin arrangement.

For production, use of a cast fin might be a better approach. A honeycomb core and skin makeup probably would be another appropriate scheme for this structure.

The best plan for production would be to eliminate the fin. This probably would be possible with sufficient, alternate stabilization by reaction forces such as tilting the thrust cylinder or providing auxiliary jets.

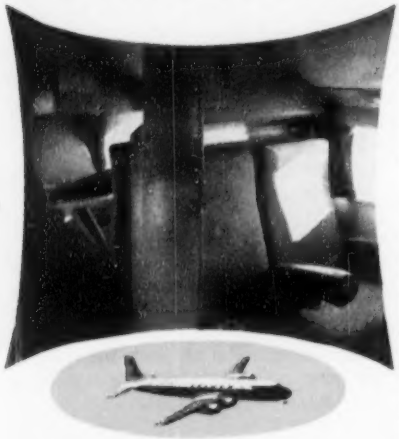
Even now, both these techniques are used as control aids in the Viking—cylinder tilting is used for pitch and yaw stabilization; auxiliary jets are used for rolling stabilization, and for pitch and yaw stabilization after main cylinder shutdown.

▶ **Metal and Wood**—Aluminum alloy is used almost exclusively throughout the Viking except for some wood and steel installations.

Wood is used internally to ease some mounting problems, steel where additional strength is required.

For the Finest

EXECUTIVE INTERIORS



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Built to the highest standards to provide uncompromising performance and dignified good taste, Adams-Rite Quality Locks should be your **only** choice. Manufacturers of aircraft hardware for over seventeen years, Adams-Rite Locks, Latches, Sanitary Valves and Drains are the accepted standard of the industry.

Write us your requirements. Also ask for the list of all Adams-Rite Closure Devices specifed as original equipment for the DC-3, C-47, DC-4, C-54, DC-6, DC-6A, DC-6B, Lodestar, Constellation, Super Constellation, Stratofreighter and Stratocruiser, Martin 202 and 404, and Convair 240 and 340.

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PRODUCTION BRIEFING

▶ **E. L. Cournand & Co., Inc.,** Havre de Grace, Md., maker of aircraft structural plastics components, has purchased the manufacturing facilities of Maytag-Waynick Co., Colorado Springs, Colo. All of M-W's equipment and key personnel have been moved to Havre de Grace.

▶ **Aviation Export Co., Ltd.,** Los Angeles, Calif., has been successful bidder on 19 de Havilland Mosquito aircraft which are being modified for high-altitude photography. Ordinarily seating two, the revised Mosquitos will seat four.

▶ **Gray Mfg. Co.,** Hartford, Conn., has received a $3-million contract from the Navy for electronic equipment.

▶ **Richmont, Inc.,** maker of torque wrenches, screwdrivers and testing and analyzing devices, has occupied a new 10,600-sq. ft. plant at 922 S. Myrtle Ave., Monrovia, Calif.

▶ **Aeronautical Services, Inc.** and Weems & Plath, Inc. have opened new offices at 229 Prince George St., Annapolis, Md. Aeronautical Services specializes in aeronautical charts and navigation equipment; Weems and Plath is U.S. distributor for German-made Plath marine navigation devices.

▶ **Century Controls Corp.** has been formed with offices and development laboratories in Farmingdale, N. Y., to specialize in design, development and prototype production of accessory control systems and accessories for aircraft, with particular emphasis being placed on production of low-pressure pneumatic controls.

ONE SECOND is all the time it takes . . .

TO CORRUGATE magnesium sheet.

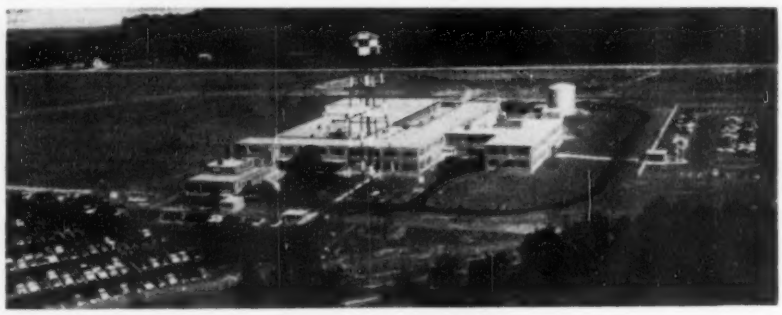
Cessna Develops New Magnesium Former

Cessna is corrugating magnesium sheet at room temperature in one second, where it used to take close to half an hour and require the use of a sandwich-type heater and stamp press.

The cost- and time-saving procedure is the result of an entirely new approach to magnesium forming, Cessna says. Key is a machine developed by the Wichita company's manufacturing engineering department and tool-die-jig department.

The corrugator embodies a moving Kirksite plate measuring 60x80 in. The corresponding steel roller, which rotates during the forming operation, is about 6 in. in diameter, 17 in. wide, and milled to accommodate the Kirksite plate's corrugation pattern. Gage of magnesium sheet now used in the production run is .040 inch.

The tool can be operated with two



KAMAN QUARTERS

Navy-owned plant of Kaman Aircraft Corp., recently dedicated at Bloomfield, Conn., will be expanded by construction of a flight test hangar containing experimental shops and offices, and a helicopter rotor test facility. The $500,000 expansion will permit separation and enlargement of experimental and production areas, both of which are located in the new Navy plant (aerial photo above). The rotor test facility, now located at Bradley Field, will consist of a reinforced concrete building (17x33 ft.) and three outside test platforms, each with its own complete test room.

BARBER COLMAN

AUTOMATIC

Aircraft Controls

. . . new motor-actuated

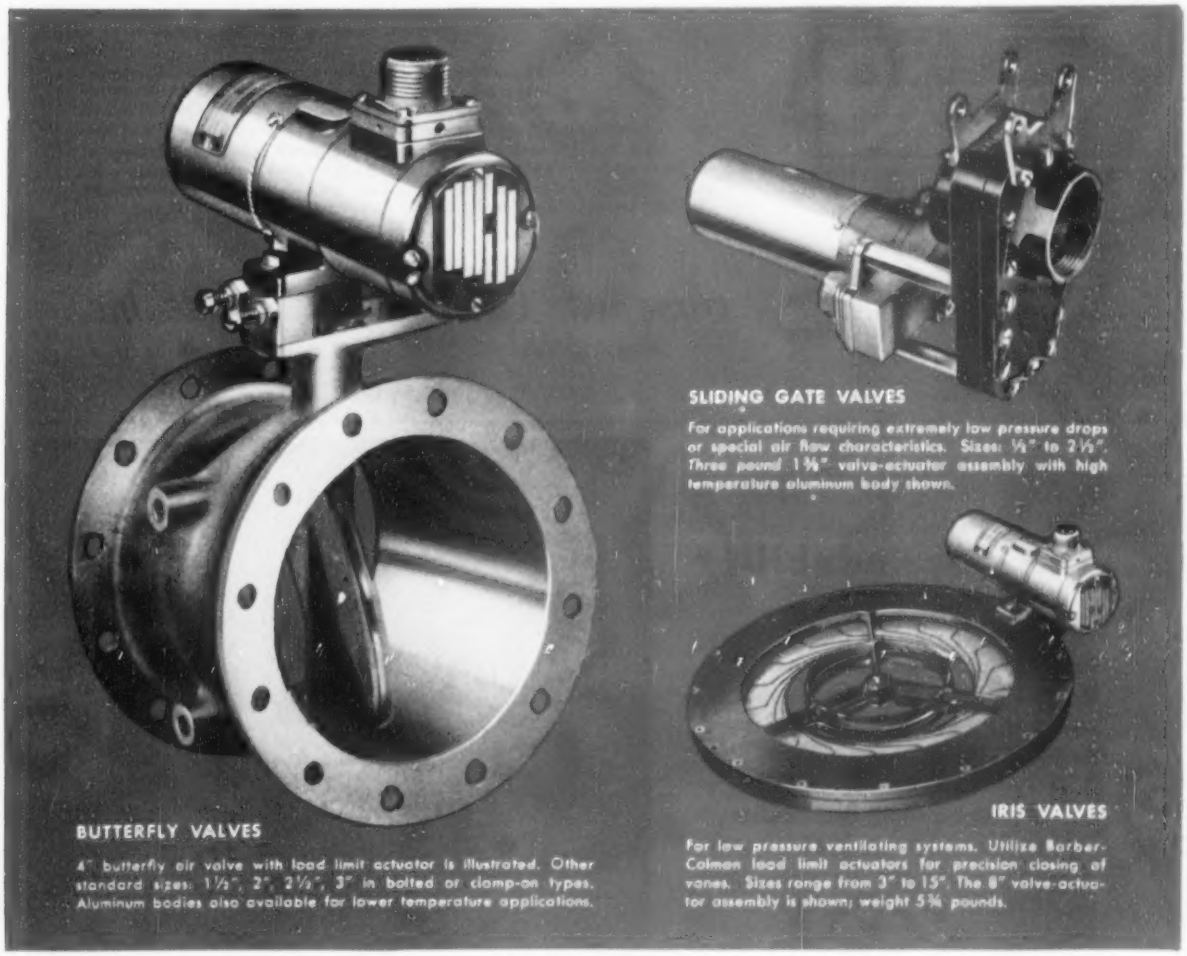
air valves designed for

high temperatures and pressures

To meet the need for low leakage, high temperature, and high pressure air valves, Barber-Colman Company has developed a new line of motor-actuated butterfly valves.

Load limit actuators and positive stops ensure repetitive precision closing for minimum leakage. Stainless steel bodies are surface hardened with special Barber-Colman process. Especially suitable for control of air in pressurization, refrigeration, and heating systems . . . anti-icing systems . . . purge gas systems . . . exhaust bleed systems . . . and other applications.

Barber-Colman air valves are also available in sliding gate and iris types . . . in a wide size range . . . to meet most requirements. Special designs can also be developed to meet the exact specifications of your application. When designing any system in which air is handled, consult your Barber-Colman control engineer for the valve best suited to your application.



BUTTERFLY VALVES

4" butterfly air valve with load limit actuator is illustrated. Other standard sizes: 1½", 2", 2½", 3" in bolted or clamp-on types. Aluminum bodies also available for lower temperature applications.

SLIDING GATE VALVES

For applications requiring extremely low pressure drops or special air flow characteristics. Sizes: ½" to 2½". Three pound 1⅜" valve-actuator assembly with high temperature aluminum body shown.

IRIS VALVES

For low pressure ventilating systems. Utilize Barber-Colman load limit actuators for precision closing of vanes. Sizes range from 3" to 15". The 8" valve-actuator assembly is shown; weight 5¾ pounds.

Write for Bulletin F-6021 . . .

gives facts and specifications on Barber-Colman Motor-Actuated Air Valves. Mail request to Dept. K, 1422 Rock Street, Rockford, Illinois.

The Barber-Colman line of aircraft controls includes: Actuators; Valves; Positioning Controls; Temperature Controls; Small Motors; Ultra-Sensitive Relays; Thermo-Sensitive Elements. Engineering sales offices in Los Angeles, Seattle, Chicago, Baltimore, New York, Montreal.

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Aircraft Controls • Automatic Controls • Industrial Instruments • Small Motors • Air Distribution Products • OVERdoors and Operators • Molded Products • Metal Cutting Tools • Machine Tools • Textile Machinery

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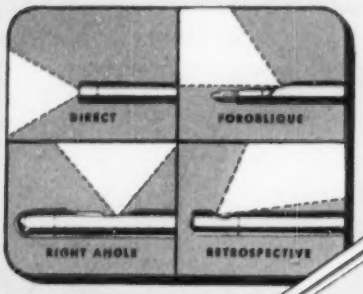
NECESSITY OF DISMANTLING AVOIDED

TIME SAVED—MONEY SAVED

A.C.M.I. BORESCOPES..



A. C. M. I. Borescopes are available in 4 angles of vision (as above) —in diameters of .120" to 4.00"—in lengths of 4" to 720". Special models for special problems.

The A. C. M. I. Borescopes permit close-up visual examination of interior areas and surfaces not otherwise visible. They save time and money, and prevent costly dismantling, by providing a practical solution to a wide variety of inspection problems.

In maintenance and inspection work, on small internal bores, machine parts or castings, to large boiler tubes, chemical plants, process equipment, or other industrial installations, an A. C. M. I. Borescope may be the answer to *your* problem.

Each Borescope is a compact, self-illuminated industrial telescope of highest quality, employing a precision optical system, that produces a flat visual field. Lens systems are fully corrected for color, spherical aberrations, and coma, with all lens surfaces coated to increase light transmission.

Write for free informational folder, or tell us your problem.

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Confidence . . . and Dependability

THE PILOT and co-pilot of the Boeing Stratojet handle their swept-wing jet bomber through control stands manufactured by Associated Company of Wichita. Associated's experience is producing these vital assemblies for the USAF's B-47 is available to the entire industry. One of Associated's latest assignments is the forward cargo door and other assemblies for the new Lockheed C-130 turboprop cargo and transport plane.

Associated has the engineering, tooling and manufacturing ability and facilities to meet YOUR requirements.

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Sheet Metal Fabrication and Assembly • Drop Hammers • Press Work • Cable and Electrical Wiring Assembly • Machine Shop Fabrication • Tool Fabrication • Finished Dies • We own and operate our own metal processing plant.

sizes of rollers—one with corrugations .300 in. deep by 1 in. wide, the other having a configuration .400 in. deep by 1 in. wide.

Reports of original laboratory tests indicated no material change in shear and tensile strengths, elongation, or grain growth of the metal, it is said.

Cessna claims there seems to be no reason why different sizes and shapes of corrugators would not operate with the same success attained with the present machine.

Alcuplate Available In Variety of Sizes

A copper-clad aluminum material, known as Alcuplate, is now available in production quantities in widths up to slightly more than 13 in. and in a variety of thicknesses and thickness ratios.

This material, already used in the aviation industry for gyro containers, relay cans, electronic chassis and other applications, combines the light weight of aluminum with the surface characteristics of copper for soldering, electroplating and electrical uses. High thermal conductivity is another characteristic of Alcuplate.

The material commonly is available in thickness ratios of 80/20 (copper layer 20%) for single-clad stock, and 10/80/10 for double-clad stock. Other ratios may be obtained. Aluminum used generally is type 2S, but 52S material may be specified. The manufacturer also has bonded copper to 54S aluminum.

Alcuplate is produced by Metals & Controls Corp.'s General Plate division, Attleboro, Mass.

Navy Contracts

Contracts recently announced by the Navy's Aviation Supply Office, 700 Robbins Ave., Philadelphia 11, are:

Cleveland Aero Products, Inc., 113 E. St. Clair Ave., Cleveland 14, Ohio, main strut assy for HUP-1,-2 aircraft, $53,017.

Emerson Electric Mfg. Co., 8100 Florissant Ave., St. Louis 21, Mo., parts for aircraft tail turrets, $84,696.

Foote Bros. Gear & Machine Corp., 4545 South Western Blvd., Chicago 9, Ill., components for use with H-25A flight control screwjacks, $68,658.

Goshen Rubber Co., Inc., 9th & Iowa Sts., Goshen, Ind., packing, "O" ring, hydraulic, $47,161.

Haloid Co., 2-20 Haloid St., Rochester 3, N. Y., photo paper for printing photographs, $41,753.

Lear, Inc., 110 Ionia Ave., N. W., Grand Rapids 2, Mich., services and material for use on F-5 autopilot components, $198,535; F-5 automatic pilot systems, 33 ea., $220,750.

Lockheed Aircraft Corp., P. O. Box 551, Burbank, Calif., maintenance parts for P2V aircraft, $146,273; transparent acrylic sheet plastic, $102,150.

Mine Safety Appliances Co., 401 N. Braddock Ave., Pittsburgh, Pa., oxygen mask, 3,282 ea., $66,402.

Minneapolis-Honeywell Regulator Co., 2600 Ridgeway Rd., Minneapolis 13, Minn., indicators for various aircraft, 514 ea., $100,362; quantity gage fuel indicator, 247 ea., $56,948.

Ray-O-Vac Co., Special Products div., 212 E. Washington Ave., Madison, Wis., battery, water activated, 6,990 ea., $32,853.

Scintilla Magneto div., Bendix Aviation Corp., Sherman Ave., Sidney, N. Y., distributor for various engines, 278 ea., $69,125.

Spencer Thermostat div., Metals & Controls Corp., 34 Forrest St., Attleboro, Mass., circuit breaker for general application, 6,649 ea., $29,588.

United Aircraft Corp., Hamilton Standard div., Windsor Locks, Conn., maintenance and overhaul parts for HSD propellers, $174,541; material for use on HSD propellers, $49,820; material for F7U-3,-3P aircraft, 114 ea., $70,680; spare parts used on propeller assemblies, $298,387; spare parts for use on HSD propellers, $124,433.

United Aircraft Corp., Pratt & Whitney Aircraft div., East Hartford 8, Conn., liner AF, 4,233 ea., $50,627; spare parts used on P&W engines, $83,484; $393,168; material for P&W engines, $249,389; valve and coupling assys., $109,164; spare parts used on P&W engines, $57,298; support and inducer for use on P&W J48-P5 engines, $514,200; material for use on R2800-99 engines, $91,717; materials for J48-P6A engines, 3,177 ea., $27,195; crankcase, seat guide, $640,469; materia for J57-P1 engines, $76,747.

Air Associates, Inc., Teterboro, N. J., actuators, $957,954.

AiResearch Mfg. Co., div. of the Garrett Corp., 9851-9951 Sepulveda Blvd., Los Angeles 45, power unit tools, $76,399.

American Bosch Corp., 3664 Main St., Springfield 7, Mass., maintenance parts for various aircraft engines, $35,813.

Bendix Products div., Bendix Aviation Corp., 401 Bendix Drive, South Bend 20, Ind., maintenance parts for controls and carburetor, $464,760; rod and strut assys., $930,449.

Canadian Commercial Corp., 2001 Connecticut Ave., Washington 8, D. C., kits, 100 ea., $60,402.

Douglas Aircraft Co., Inc., El Segundo, Calif., strut assemblies for AD aircraft, $167,943; maintenance parts for AD aircraft, $85,043.

Eclipse-Pioneer div., Bendix Aviation Corp., Teterboro, N. J., tools and test equipment for overhaul of various instruments, $86,626.

General Electric Co., Lamp div., 3201 Walnut St., Philadelphia 4, Pa., incandescent electric lamps, $27,481.

G. M. Giannini & Co., Inc., 332 Springfield Ave., Summit, N. J., telemetering equipment and reliability test, $104,062.

Goodyear Aircraft Corp., Akron 15, Ohio, envelopes, $397,225.

Goodyear Tire & Rubber Co., Inc., 1144 E. Main St., Akron 16, Ohio, disk, 32,925 ea., $657,374; maintenance parts used on brake assy., $680,542.

Kearfott Co., Inc., 1150 McBride Ave., Little Falls, N. J., rate gyros and reliability tests, 66 ea., $65,454.

Leland Electric Co., 1501 Webster St., Dayton 1, Ohio, inverters and reliability tests, 33 ea., $28,200.

Metalcraft Mfg. & Sales Corp., 111 E. 17th St., Kansas City 8, Mo., radar bench assemblies, $33,999.

Pacific Optical Corp., 5965 W. 98th St., Los Angeles 45, Calif., lens assys., $28,595.

Parker Aircraft Co., 5827 W. Century Blvd., Los Angeles, Calif., valve assys., $327,060.

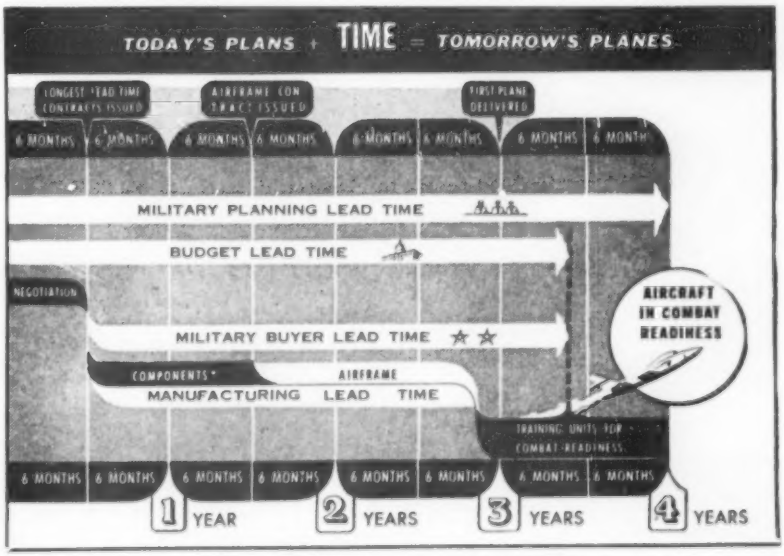
Piasecki Helicopter Corp., Morton, Pa., services and material to overhaul rotor blades, $148,809.

Raymond Rosen Eng. Prods. Inc., 32nd & Walnut Sts., Philadelphia 4, Pa., telemetering instruments and reliability tests, $93,917.

Thompson Products, 23555 Euclid Ave., Cleveland 17, Ohio, pumps, 130 ea., $116,681; various $140,351; 1,037 ea., $253,852.

Westinghouse Electric Corp., Aviation Gas Turbine div., Lester Branch Post Office, Philadelphia 13, Pa., material for WEC engines, $51,629.

United States Rubber Co., 10 Eagle St., Providence, R. I., life boat, 217 ea., $123,228.



THE MEANING OF LEAD TIME

Why does it take so long to turn defense dollars into defense planes? This chart, prepared by the Aircraft Industries Assn., illustrates the four basic elements in the 48-month lead time the industry says is necessary to create combat-ready air units equipped with additional quantities of a military fighter plane already in production. The time varies with complexity of the particular plane, and even longer period is required to design and develop completely new aircraft. Components in the manufacturing-lead-time phase include engines, radar, armament, fire-control systems, etc., procured by the military services and furnished to the airframe manufacturer.

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American uses
SINCLAIR AIRCRAFT OILS
exclusively!

NEW DOUGLAS DC-7's COAST-TO-COAST!

Another significant achievement in commercial aviation is scheduled for this fall when American Airlines inaugurates its new, coast-to-coast service—the first scheduled non-stop coast-to-coast—and, in under 8 hours!

As continents grow smaller, the engines that span them grow more demanding. Sinclair is proud that American chooses Sinclair Aircraft Oil for the vital assignment of engine lubrication . . . proud, too, that our oil is a valued crew member on so many airliners. *Today, more than 45% of the oil used by major scheduled airlines in the U. S. is supplied by Sinclair*. . . solid proof that *you* can rely on Sinclair. Whether your lubrication problems involve economy or performance, we can help you—today!

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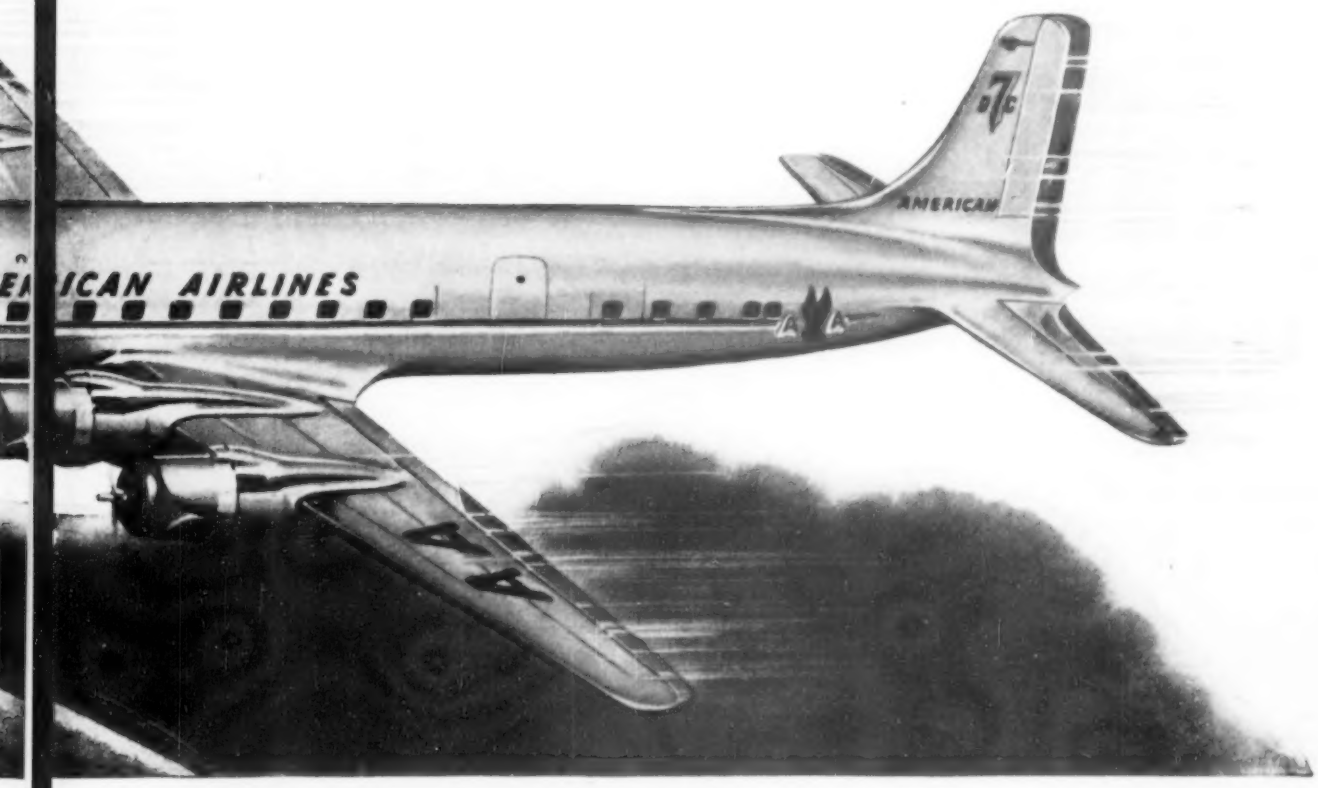
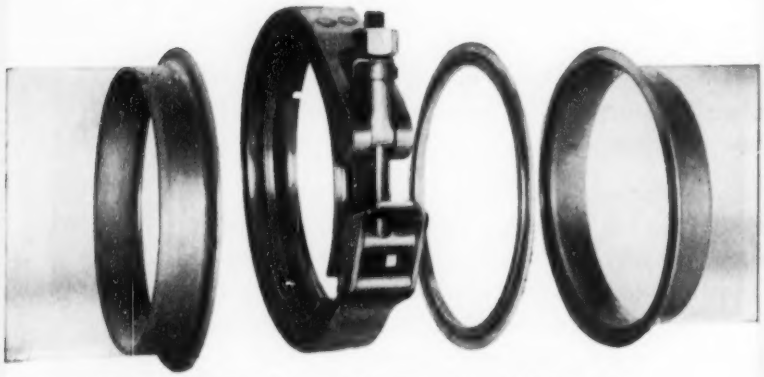


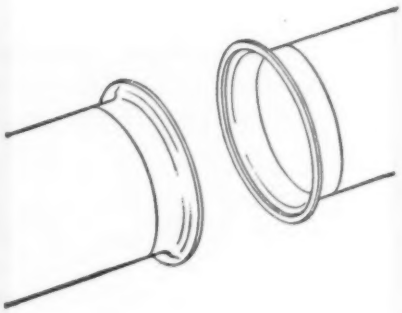
Lightweight LIVE JOINT SYSTEM

FOR HIGHER TEMPERATURES AND HIGHER PRESSURES

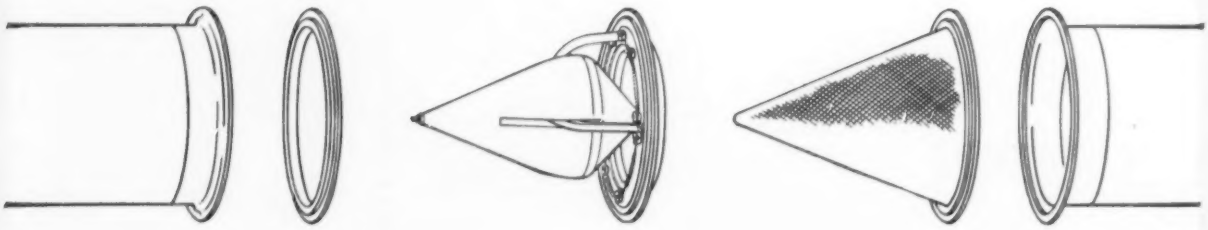
Completely new Marman live joint system speeds assembly—cuts costs—saves weight. It consists of a V-Band Coupling with integral stainless steel flanges. The unique design of the joint allows the introduction of a screen or check valve in the joint assembly without further modification.



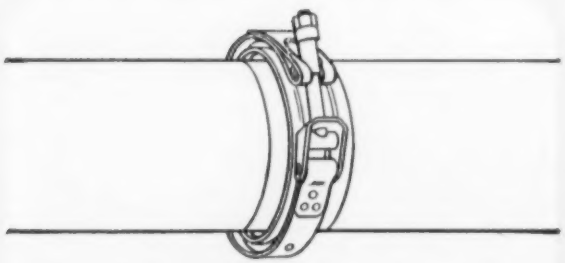
Components of new Marman live joint system.



1. Weld flanges to ducting



2. Insert metal self-aligning seal, . . . valves . . . . . or filters.



3. Assemble with Marman V-Band coupling for positive seal and dependable operation.

Easy to specify for quick delivery in a wide range of sizes—for information write Dept. W-5

MARMAN PRODUCTS CO., Inc.
11214 EXPOSITION BLVD.
LOS ANGELES 64, CALIF.

Patent Applied For

9-432

AVIONICS

Electronics Seen Vital to Survival

Our superiority in this field is what may save us in world conflict, GE official tells RTCA meeting.

Superiority in the science of electronics, or lack of it, may determine whether democracy survives the present world conflict. This is the warning expressed by Dr. W. R. G. Baker, General Electric vice president, speaking on "The Role of Electronics in Powered Flight" before the recent Fall Assembly Meeting of the Radio Technical Commission for Aeronautics, in Washington.

Baker, general manager of GE's electronics division, cautions that "other countries are making rapid technological advances . . . (that) could constitute a threat to our security."

In a two-day session, some 250 delegates also heard the following:

• **G. T. Willey,** vice president-manufacturing of Glenn L. Martin Co., emphasized that as long as U.S. industry maintains its "aggressive production capacity" and retains its pioneer spirit, "we will have nothing to fear from British competition."

• **Joseph P. Adams,** Civil Aeronautics Board member, said: "The achievements of the Radio Technical Commission for Aeronautics fully repay the investments of your government agencies and private industry by channeling our efforts in one direction. . . . The communications developments which have gone hand in hand with our air transport development and our military aviation achievements have come about largely as a result of this common meeting ground and common working agreement."

• **Brig. Gen. Hunter Harris, Jr.,** chief of USAF's War Plans Division, reported: "Much of our national air power strength generates from the mutual civil and military relationships involved in a common aircraft industry, similar aviation radio and electronics, like airbase facilities and many parallel requirements for identically trained people."

• **Rear Adm. Richard W. Ruble,** director of Aviation Plans Division in the Office of Chief of Naval Operations, predicted that "a kind of television" possibly may be the answer to landing carrier aircraft in zero-zero or heavy weather conditions when visibility is at a minimum.

▶ **Growing Crystals**—To maintain our technological position, Baker urged that more funds and manpower be applied to basic electronic research, and he called for the development of imaginative and radically new methods of producing electronic equipment.

"It may be possible, in effect, to grow capacitors, resistors, as well as transistors into a single crystal," Baker says. He also stresses the need for stimulating the interest of more high school students in an engineering or technical career.

▶ **Avionics' Role**—The role of avionics today "is to assist humans in the safe, economical movement of aircraft (plane or missile) from its point of departure to its destination," Baker believes. "Tomorrow's job . . . will be to remove the human factor from powered flight."

Baker points out that electronics was first applied to aircraft little more than 25 years ago, but until 1941 was used

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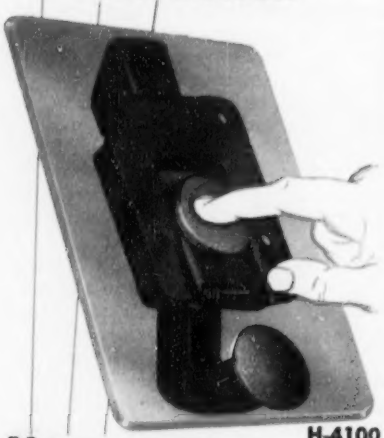

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primarily for communications and navigation. "After 1941, there was a major revolution in the application of electronics to aerial warfare," he says. New uses included aircraft flight control, fire control, search and detection, and countermeasures. The next logical step was to integrate these various devices into systems to provide more automaticity.

Since the end of World War II, avionics "has been the subject of bitter condemnation from the standpoint of cost, complexity and unreliability; it has also been acclaimed as responsible for our air superiority in the Korean conflict," Baker notes. "Many of the criticisms . . . on the basis of complexity and unreliability have a basis in fact and to some extent I believe the electronics industry must bear the blame," he states.

Industry efforts to improve reliability and cut complexity have centered on making existing types of components more reliable. Baker thinks these investigations don't go far enough "for they still conceive of electronics as tubes and capacitors and resistors connected in a certain sequence," a reference to his idea of "growing" resistors, capacitors, and transistors in a single crystal.

▶ **Must Pay Its Way**—"Electronics, to be of value, must perform a useful task, either better or more economically than can be done by other means, or one that cannot be accomplished in any other way. The economic factor is always present," Baker says. Pointing out that the cost of both military and civil aircraft has risen by a factor of 5 to 10 in the past 10 years, Baker says it "becomes increasingly more practical to create through electronics, a system that will decrease the time that the aircraft is not paying its way."

GE'S BAKER: Absorb, analyze, act.

The problem, whether military or civil, is "to launch the craft from one point on earth, guide it as quickly as possible with the least possible chance of interruption of the flight to another point," he states. For piloted or passenger-carrying aircraft, human comfort and safety must be factored into the solution, he adds.

▶ **System Capabilities**—The task of avionic systems is to prevent external forces, such as weather, gravity, acceleration, atmosphere, or enemy weapons, from affecting the airframe, its powerplant, and its control system. To do this, "the system must be capable of absorbing hundreds, perhaps thousands of units of information each minute, analyzing this information, and then acting upon it," Baker points out.

The system must be capable of remembering and must be able to select any one of a large number of alternative actions. It must not be responsive to either man-made or natural interference, yet it still must be able to follow directions from an outside source.

Above all, the system must be economical, from the standpoint of cost, weight, complexity, reliability, and usefulness, judged by the type of work it must perform.

▶ **Utopian?**—Is it possible to devise such complex avionic systems and make them reliable? Baker thinks it is. He

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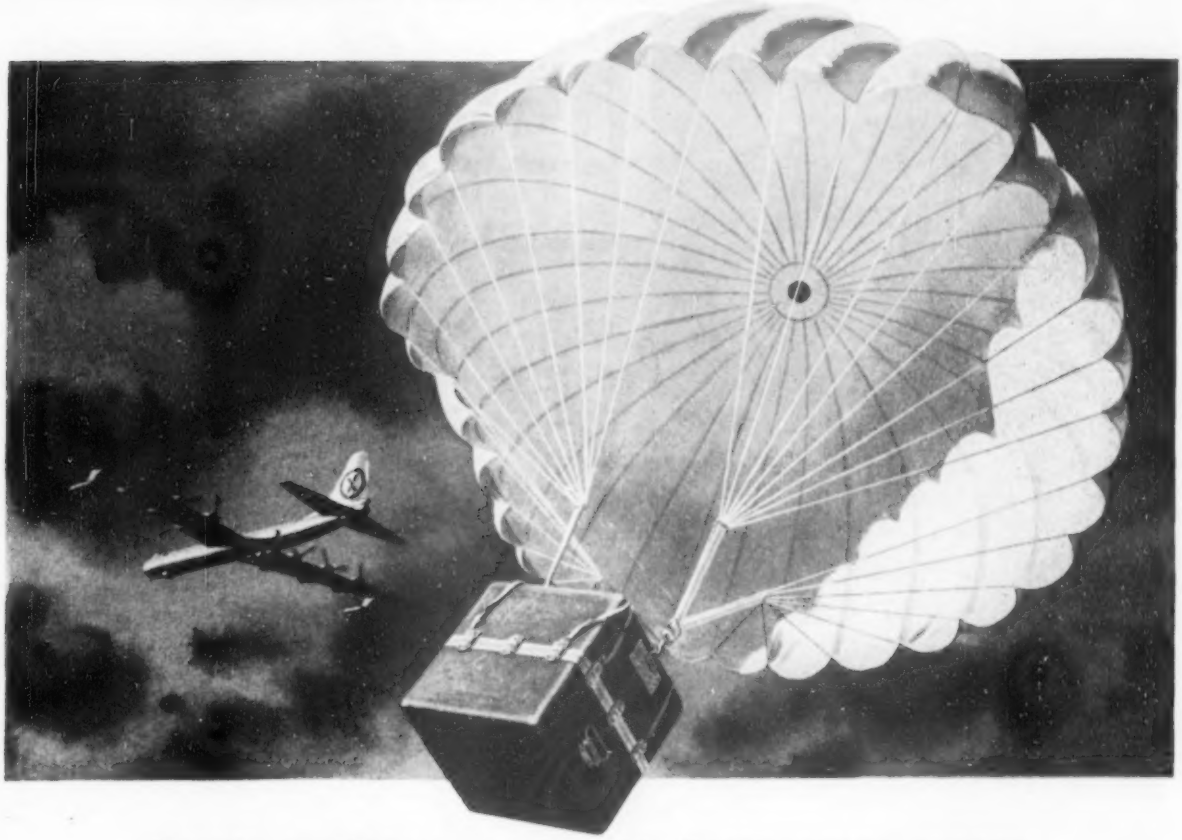

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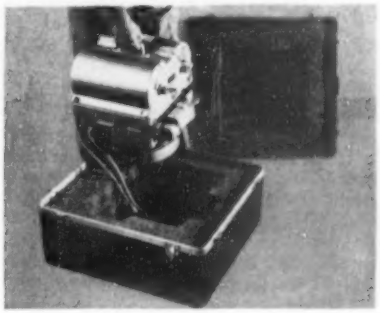

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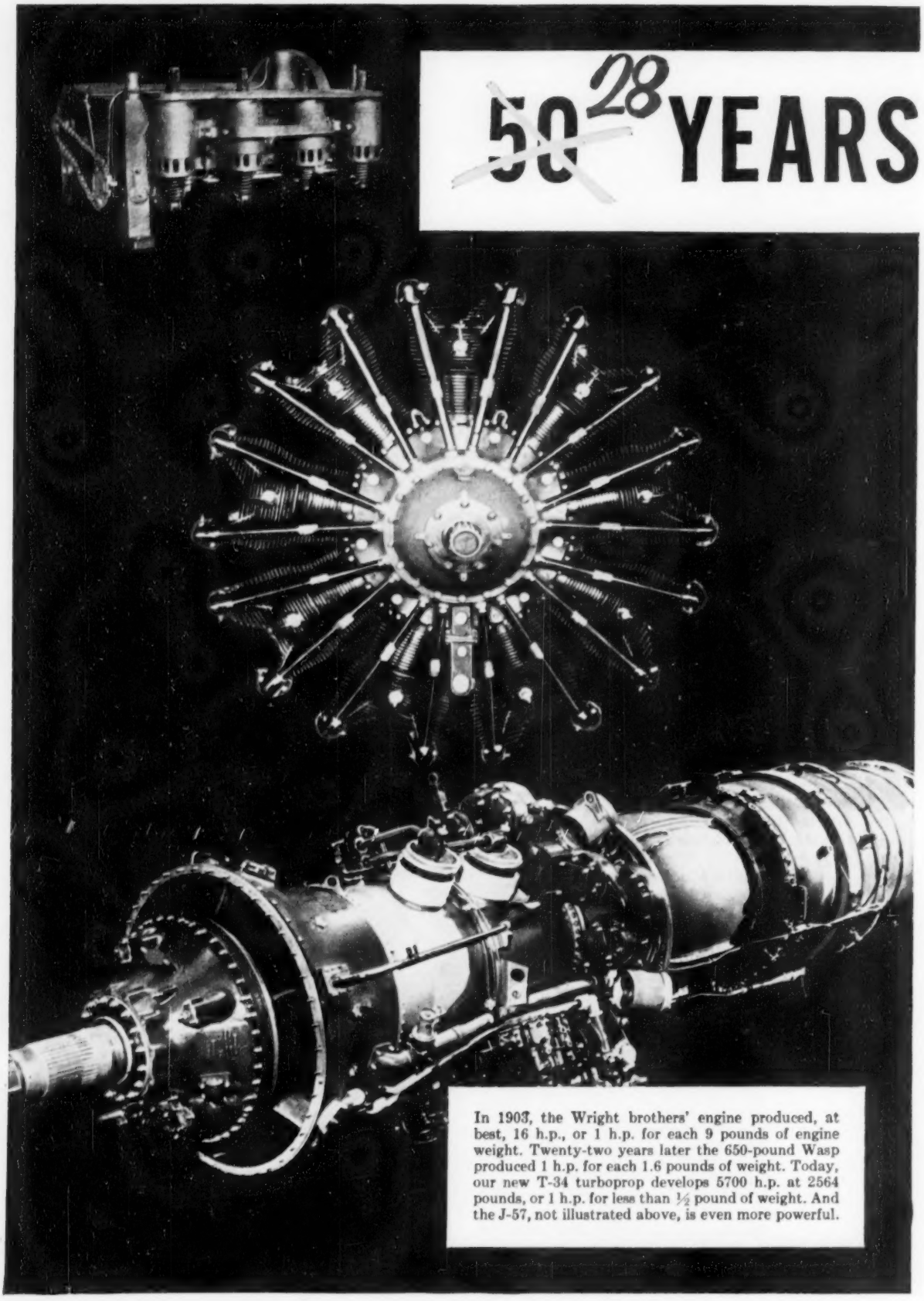

In 1903, the Wright brothers' engine produced, at best, 16 h.p., or 1 h.p. for each 9 pounds of engine weight. Twenty-two years later the 650-pound Wasp produced 1 h.p. for each 1.6 pounds of weight. Today, our new T-34 turboprop develops 5700 h.p. at 2564 pounds, or 1 h.p. for less than ½ pound of weight. And the J-57, not illustrated above, is even more powerful.

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By contrast, development and production of today's most powerful engine, the J-57, required millions of engineering manhours . . . and much of Pratt & Whitney's 6,000,000 square feet of floor space. Thousands of special skills and more than 20,000 special tools are required to produce it.

Between the Wasp and the J-57 lies much of the history of aviation. And from this history many important lessons have been learned, not the least of which is this: America's security demands consistent development and production of better and more powerful aircraft engines.

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bases his opinion on the great progress which has been made in servo mechanisms, missile guidance systems, electronic computers and memory systems, and in the areas of semi-conductors, magnetics, and ferrites, which may eliminate the need for electron tubes.

The prospect of automatic flight is not solely a military concern, Baker points out. "Even commercial planes are moving closer to the supersonic barrier, with its attendant problems of greater cost operation. And man is always . . . seeking to arrive at all-weather flight," he says. "The combination of the two tend to create more and more complex devices to safeguard the lives of the passengers and to protect the sizeable investment in equipment."

▶ **More Research Needed**—To speed the advent of fully automatic flight, and to strengthen our nation's security, Baker calls for more funds and manpower for basic research. "Because of the scarcity of qualified electronics engineers and scientists, coupled with the demands of the armed forces for the latest in electronics equipment, the best of our scientific talent is often diverted from pure research to applied research," he says.

"We have not looked far enough ahead . . . to devise the electronic tools needed to carry out the tasks which must be performed 10 or 20 years from now," Baker warns. "Continuing effort to increase our technical knowledge may well be the price of survival," he concludes.

▶ **Carrier Approach**—Admiral Ruble praised the avionic developments that have made possible the "carrier control approach system, by means of which pilots are controlled on their let-down and are brought up the groove to a point where they can see the landing signal officer at his station on the ship's stern."

He explained, however, that it was not the final answer, because the system does not solve the problem of landing on a rolling, pitching carrier deck during a storm when visibility is poor. It is not beyond the possibilities of science, the admiral said, to give the Navy adequate equipment to permit carrier landings during zero-zero conditions.

Navy's defensive weapons system—the hunter-killer air teams—would be "mild as May without electronics, no more a war machine than a swan boat in the Tidal Basin," he said.

▶ **Continuing Problem**—Gen. Harris told RTCA delegates that "to deter war, military aviation must be maintained at a high degree of readiness; it must also serve as an instrument of national policy in our peace objectives."

Quoting from a recent speech of Britain's Air Marshal Lord Tedder, the

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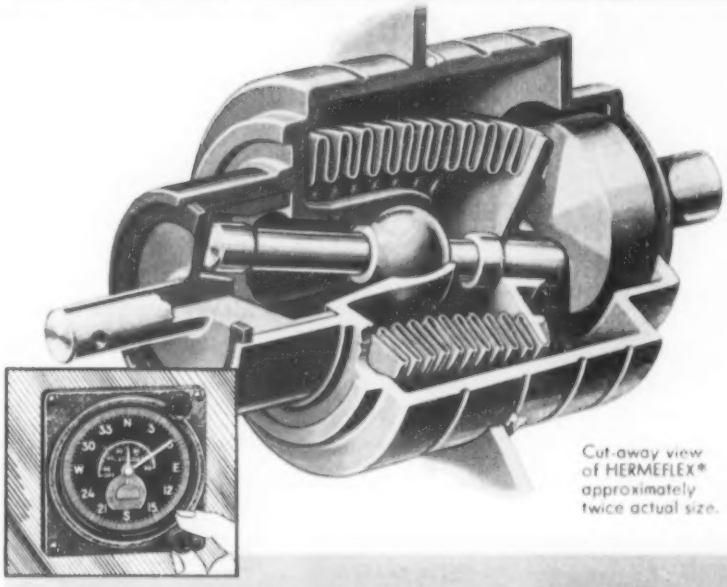

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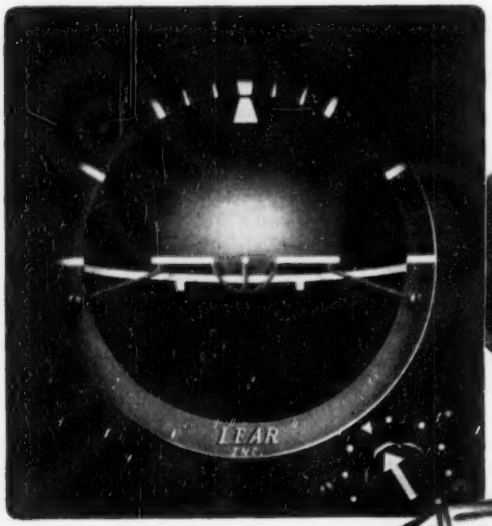

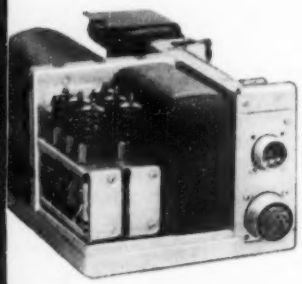

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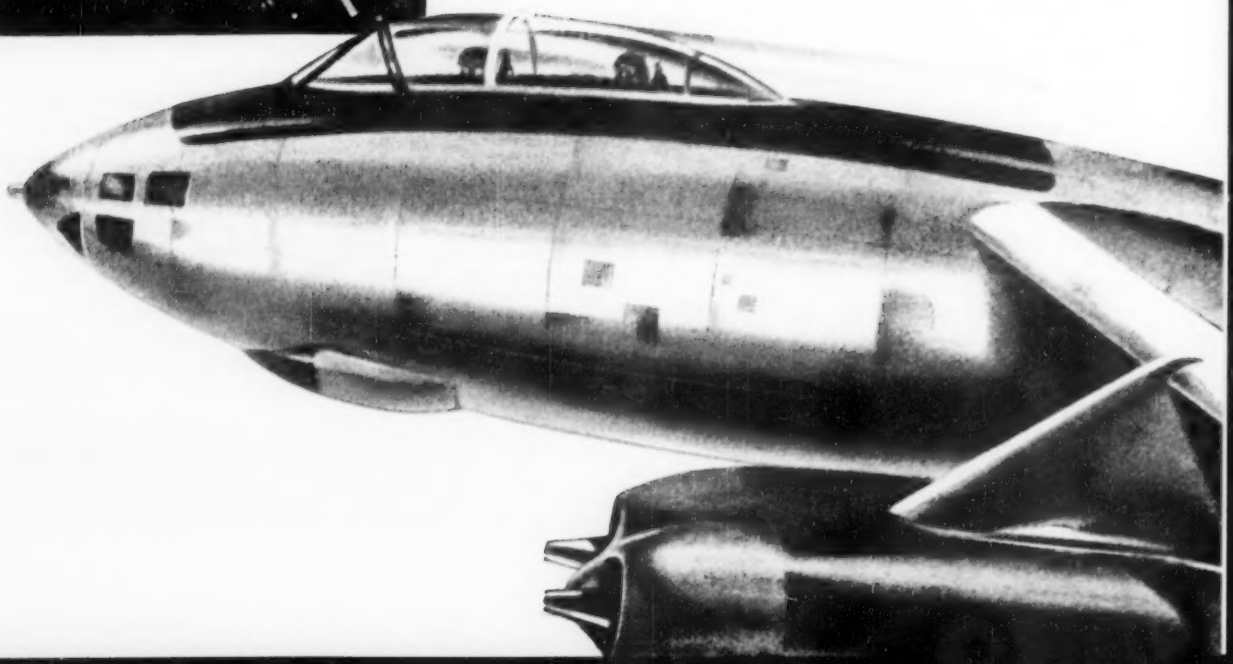


general pointed out that the period when the British fleet was an effective deterrent to war is over.

"There is no doubt that during the recent critical years, the peace has been kept by a new deterrent—the American strategic bomber force and its atomic weapons," Harris said.

"Our combat results in Korea prove once again that we should not sacrifice quality for quantity. The quality of our aircraft can be attributed directly to the amount of research and development effort expended."

He gave industry its due, adding that technical skill, industrial ingenuity and pioneering spirit of civilian contractors have made possible many of our present-day capabilities.

"Unfortunately the services have not been able to assure industry of military contracts on a continuing basis," the war plans chief said. "This is a continuing problem which requires that we secure adequate recognition of the vital importance of research and development to our national air power."

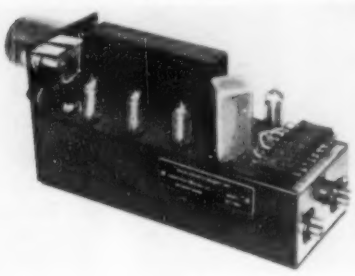
► **Mutual Planning**—Col. Adams said: "The time has come for the entire aviation industry and the public to realize that the so-called common system of air navigation, under which American civil and military aviation flies today over this continent, is largely a result of the mutual and cooperative planning by all segments of American aviation across the meeting table of the RTCA."

—PK-RB

Counters for Digital Systems Announced

Several new devices for use in digital computers and automatic data handling equipment have recently been announced which are of interest in the aviation field. Among them:

• **Memory unit.** A complete plug-in quartz-line memory unit capable of storing 384 "bits" at a pulse repetition rate of 1 mc. is available from the Computer Control Co. The device is designed for use in an airborne environment and incorporates a heating element and thermostat to maintain quartz-line stability. Input voltage to the write-erase gate is 10 v.; reshaped output signal is 15 v. into a 100-ohm load; carrier frequency is 20 mc. Di-



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Valve Talk

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by Marvin Miles,
Senior Member, Aviation Writers Assn.

Renewed speed rivalry between the United States and England — and between rival companies in each nation — brings up the inevitable question: What does a world speed mark accomplish?

Publicity-wise — it brings world-wide coverage — and if successful, it adds prestige to the country, military service and manufacturer setting the new mark.

Technical data, of course, would be determined in test procedures in any case, but if the added assistance of special electronic photo timing is available, together with a chance to win renown through press, radio, television, newsreels and magazines, why not challenge the standing record?

I refer to the three kilometer (1.863 miles) record, foremost speed achievement in a long list of honors set up by the Federation Aeronautique Internationale, Paris, world record organization represented in the United States by the National Aeronautic Association.

The newsman's duty (often overlooked) in covering such an event is to explain the difference between FAI-NAA world records, such as the Douglas (Navy) Skyray's recent 753.4 m.p.h., and the all-time speed of 1238 m.p.h. set by the Douglas (Navy) D-558-2 Skyrocket research plane.

To the average reader speed is speed, and a mere 753.4 m.p.h. is nothing compared with 1238 m.p.h. So it's necessary to point out most carefully that the rocket plane was air-dropped and that its mark was made downwind in the thin atmosphere of extreme altitude, with a power duration of only three minutes.

On the other hand, the carrier-borne Skyray — designed for mass production rather than as a special research craft — took off under its own power, made four consecutive runs over the measured course (two in each direction to offset wind) and held below a maximum altitude of 100 meters (328 feet) on the timed passes while ramming itself through gargantuan air loads on a precise track.

With American, British — and probably French — jet fighters capable of whipping well toward the speed of sound at deck level, temperatures are today a vital factor in record assaults. Sonic speed advances about ¾ (three-quarters) of a mile per hour with each added degree of temperature.

When the Skyray set her record in 99-degree heat at California's Salton Sea, the speed of sound was 793 m.p.h. But she still broke (by more than the required one percent) the 737.3 m.p.h. mark set by Britain's Supermarine Swift in a Libyan Desert temperature estimated at 103 to 120 degrees.

Vital factors in the runs, too, are wind conditions (shifting or gusty currents) and convection turbulence, together with pilot skill in getting the utmost performance out of the aircraft under rule restrictions, limited fuel time, etc. And, naturally, plane and power plant must be in perfect order.

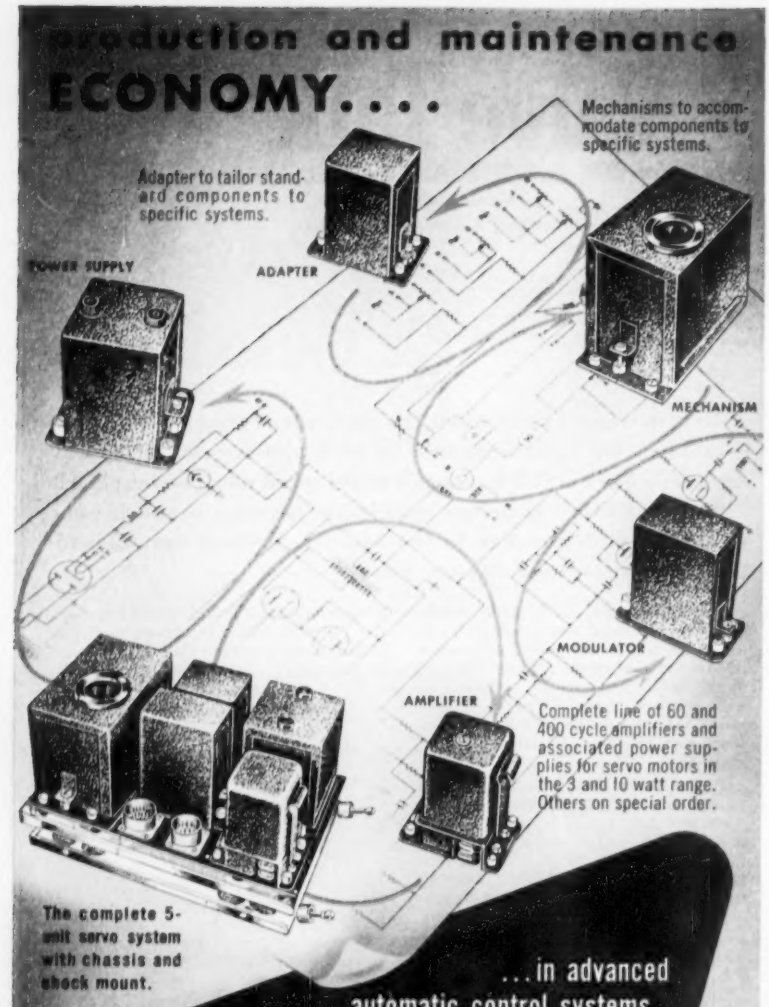
Recently the Air Force and the Navy have exhibited an alarming tendency (as yet not materialized) toward secret speed assaults; in other words, a trend toward officially-timed runs that would be publicized only if a record is broken.

This, in my opinion, would be extremely poor public relations. It would seem reasonable to expect that if a speed assault is made, with publicity and international honors in view, that an unsuccessful challenger would, in all fairness, promptly announce the results of his runs, even if the desired record is not forthcoming.

What's ahead?

The Air Force apparently will make a determined effort to recapture the record with the North American F-100 Super Sabre (if it has not already done so by the time you read this), but it will take better temperatures and perhaps a full-rated Pratt & Whitney J-57 engine to average the new minimum of 761 m.p.h. Other probable contenders are Convair's delta-wing XF-102, Republic's XF-103 and Lockheed's lightweight XF-104.

NAA officials tell me they feel it will be some time before sonic speed is reached at deck level, but I'll guess it'll happen within a year. They say, too, that no change in course or rules will be necessary until the speed of sound is achieved. Then the course undoubtedly will have to be lengthened and the minimum altitude will have to be raised. But how high, commensurate with safety and exact timing?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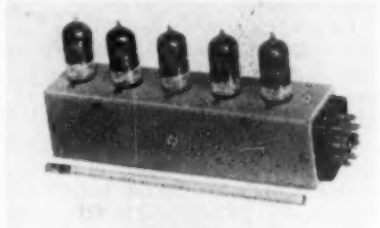
mensions are 4½ x 5½ x 10 in. Computer Control Co., 106 Concord Ave., Belmont 78, Mass.

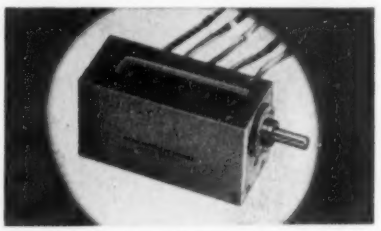
• **Binary counter.** A nine-stage magnetic binary counter, Model 1001, suitable for pulse rate scaling and digital control systems, has been introduced. Device can be operated at counting rates up to 50 kc. from a sine wave or pulse at least 4 microseconds wide at 15-30 v. It will count down pulses by a factor of ½ to 1/512. Device is constructed in a plug-in chassis whose di-



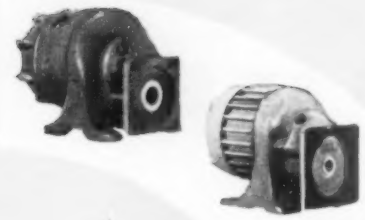
mensions are 8x2x2 in. Same manufacturer has a new Model 1002 gating unit, also a plug-in package, which permits pulse multiplication and division when used with the Model 1001 counter. Laboratory For Electronics, Inc., 75 Pitts St., Boston 14, Mass.

• **Counting tubes.** Two new cold-cathode glow transfer counting tubes, made by Ericsson Telephone Ltd., are now available from Atomic Instrument Co. One, the GCIOB, is a bi-directional decade counter tube which can operate at input frequencies up to 4,000 pulses/sec. The count is visually indicated by the position of the glow on one of ten radially spaced cathodes grouped around a center anode. The tube will develop a 15-v. output signal across a cathode resistor. The second tube, the GCIOM, is a miniature bi-directional decade counter capable of operation at 600 pulses/sec. Atomic Instrument Co., Dept. GC-1, 84 Mass. Ave., Cambridge, Mass

• **Decade counters.** Two new decade counters, one for converting analog voltages into digital indications, and the other for converting pulse inputs to digital indications, have been announced. The Digipot is available with either three or five digit wheels, each of which positions the wiper of a poten-



tiometer. The Digicon, also available with three or five digit wheels. Wright Engrg. Co., 180 E. Calif. St., Pasadena 1, Calif.



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8. Vibration
9. Acceleration
10. Overspeed
11. Radio noise
12. Static

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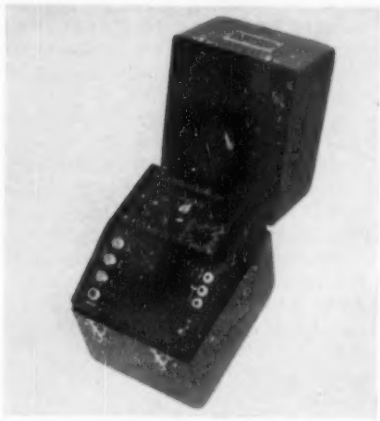
JENKINTOWN PENNSYLVANIA

NEW AVIATION PRODUCTS



Portable VHF for 2-Way Air-Ground Communication

A new lightweight, portable VHF transmitter-receiver combination, designed for two-way VHF air-ground communications, is being put on the market by LearCal division of Lear, Inc.

With a weight of approximately 22 lb., the unit is compactly contained in an all-metal carrying case which measures 8½x10¼x12 in.

Designated Model LTRA-6P, it is made up of a tunable VHF receiver with frequency range of 108 to 127 mc., a 2-w., 12-channel crystal-controlled VHF transmitter with frequency range of any 4-mc. band from 118 to 150 mc., and a standard broadcast and range band, low-frequency receiver. Unit also contains a 75-mc. marker beacon.

In addition there is a built-in 5-in. loudspeaker with two jacks for earphones. It has a self-contained dynamotor power supply and is available for either 12 or 24 v.

Installation is quick and simple. Power cable is connected to any primary 12-v. electrical system in aircraft or ground vehicle, antenna is plugged in and the communication unit is ready for operation.

LearCal division, Lear, Inc., 11916 West Pico Boulevard, Los Angeles 64, Calif.

New HF Pressure Cells Tie In to Oscilloscope

A new line of high-frequency pressure cells used for measuring pressure variations has been put on the market by Baldwin-Lima-Hamilton Corp.

Designated SR-4 type HF, the cells come in five standard capacities: 1,000, 2,000, 5,000, 10,000 and 20,000 psi. The company states that other capacities are available.

Each of these cells consists of a pressure sensitive tube on the outside, to which SR-4 strain gages are bonded. Electrical indicators or recorders of the potentiometer type may be used to measure pressure changes, but cells are usually connected to oscilloscope or oscillograph for high frequency response.

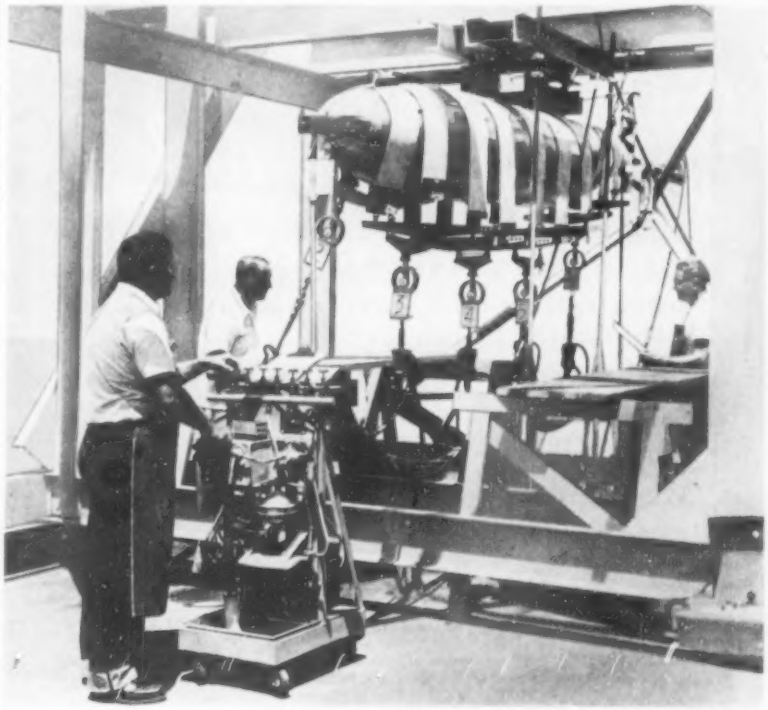
According to BLH, upper frequency response is almost never limited by the pressure cell but by cavity resonance of the tank or piping connected to it. Cells are said to have extremely high accuracy and sensitivity, and are of rugged construction.

Temperature compensation is provided over a wide range to prevent changes of zero and sensitivity (output).

High accuracy reportedly can be obtained in static pressure measurements in a temperature range from minus 60F to plus 150F, but the company says, other types of SR-4 high pressure cells are usually preferred for these measurements.

BLH cells are 5½ in. long, 2 in. in diameter, and weigh 1 lb. They were designed for 50% higher output using voltages up to 25 v.

Baldwin-Lima-Hamilton Corp., Philadelphia 42, Pa.



Pastushin-designed static test stand applies 20-ton "squeeze" to jettisonable fuel tanks

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Long and specialized experience in design and production combined with far-sighted emphasis on research and development equip Pastushin Aviation for new requirements in external stores, aircraft structural and mechanical components, and aircraft ordnance components and installations.

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Twin Aero-Rest

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3900 Cohasset Street
P. O. Box 127
Burbank, California

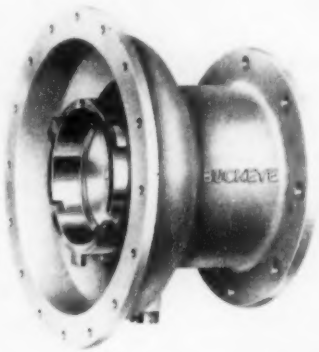
High-Heat Masking Tape For Aircraft Metals

Minnesota Mining and Manufacturing Co. is offering a pressure-sensitive masking tape to aircraft and electronic manufacturers for use on treated metals such as anodized aluminum and dichromated magnesium.

Known as Scotch brand high-temperature masking tape No. 214, it is intended for use in oven temperatures up to 325F and is reportedly capable of withstanding higher temperatures in bake cycles.

The tape is available in widths from ¼-in. to 36-in. on 60-yd. rolls.

Minnesota Mining and Manufacturing Co., 900 Fauquier St., St. Paul 6, Minn.



New Fueling Adapter for Quick-Couple Nozzle

Buckeye Iron & Brass Works has placed a new adapter on the market for use with its quick-coupling, single-point aircraft refueling nozzle.

Mounted under the wing, the unit has a self-centering tapered seat. Internal contour reportedly provides maximum flow with minimum pressure loss.

Both the adapter and nozzle are designed for fueling and defueling. Manufacturer states that they meet USAF and BuAer specifications.

Buckeye Iron & Brass Works, Dayton, Ohio.

Special Wrench Wraps Wire Around Terminal

A wire-wrapping tool, used for wrapping either stranded or solid wire around terminals on boards or hermetic seals, is a new product of Contact, Inc.

Known as Wire-Wrench, the unit is said to wrap one or more wires around a terminal with a single turn. Wire is placed against terminal, tool is placed over terminal, catching wire in its notch. One twisting motion wraps wire around terminal into tight connections, ready for soldering.

Extra feature of the unit is a drilled

Changing the map of the world

--with RCA Shoran

A SHIP SANK in these remote straits—because a chart was wrong. But that won't fool navigators any more. Modern aerial survey . . . using RCA Shoran and photography together . . . recorded the *true* shoreline (the lines in white). Now, the charts are right!

Surpassing any optical survey system now in use, this radar "yardstick" can map land-and-water areas never explored by man—and do it at flying speeds as high as 600 mph. Accuracy is better than 50 feet in 100 miles or more.

Just another application of RCA Shoran—added to its use in locating oil wells, plotting microwave radio relay and pipeline routes, detecting mine fields, and precision bombing.

You, too, can help our Armed Forces keep our country safe. The U. S. Air Force urgently needs men and women volunteers to spot enemy aircraft—man Air Defense filter centers—do the many jobs as part of the Air Defense team. 200,000 patriotic Americans are serving. 300,000 more are needed.

JOIN NOW! Contact your nearest local Civil Defense Director.
Or write to:
Ground Observer Corps, U. S. Air Force, Washington 25, D. C.

RCA

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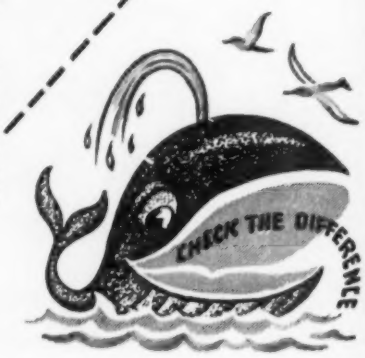
ENGINEERING PRODUCTS DEPARTMENT CAMDEN, N. J.

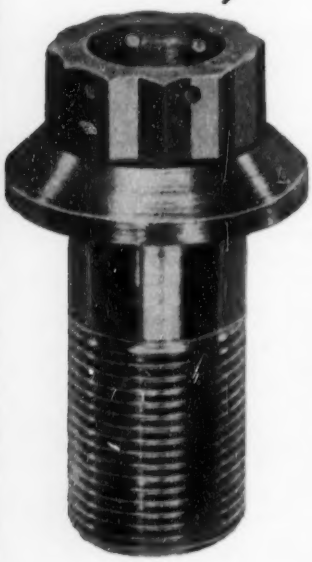
There's a "Whale" of a Difference! BUT...

Each fastener is important in its particular Job. There is also a "WHALE" of a difference in the finished product as well, depending on Manufacturing Know How, Equipment, etc.

The rivet shown is used on Jet after-burners where they must withstand extremely high temperatures. We manufacture them in a variety of sizes from AN 123151 through 132262 of number 347 stainless steel.

actual size of AN 123168





Lockheed special 725400

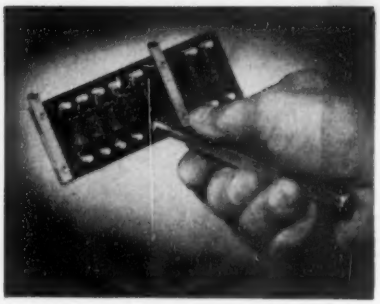
This Lockheed special No. 725400 is a special High heat treat cold headed bolt with P.S.I. of 180,000 to 200,000, with a diameter of 1⅞" at the shoulder and 1⅛" dia. at the threaded section. The head is 12 point. The radius under the head and the threads are rolled after Heat Treat to control grain flow for strength. This bolt has a very high fatigue percentage. Ground before Heat Treat because of no decarburization, thereby eliminating surface strain.

We manufacture large bolts from NAS 464-3 thru sixteen AN 9 thru 16 . . . AN 173 thru 186 etc.

We specialize in the manufacture of Aircraft Rivets and Bolts to AN-NAS and MS standards.

BRILES MANUFACTURING COMPANY

COLD HEADED RIVETS AND BOLTS
3/32" to 1½" Dia.
EL SEGUNDO, CALIFORNIA



hole and milled flat, used for putting hook in wire when necessary.

Wire-Wrench comes in three sizes: WW1 for miniature terminals, WW2 for medium size, and WW3 for large terminals.

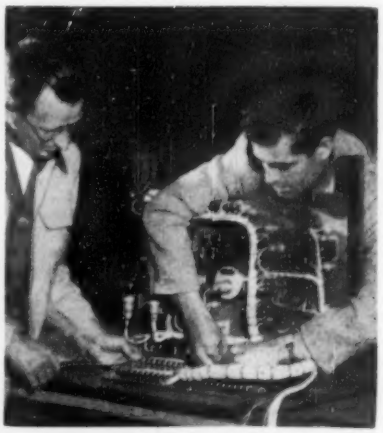
Contact, Inc., 238 Main St., Cambridge, Mass.

Paste Facilitates Release Of Plastic From Mold

A new lubricant has been developed to facilitate release of polyester, epoxy and other plastics from molds. Intended primarily for use on porous or semi-porous molds, such as wood, polyester, plaster and aluminum, the material is a paste applied with a cloth or a brush.

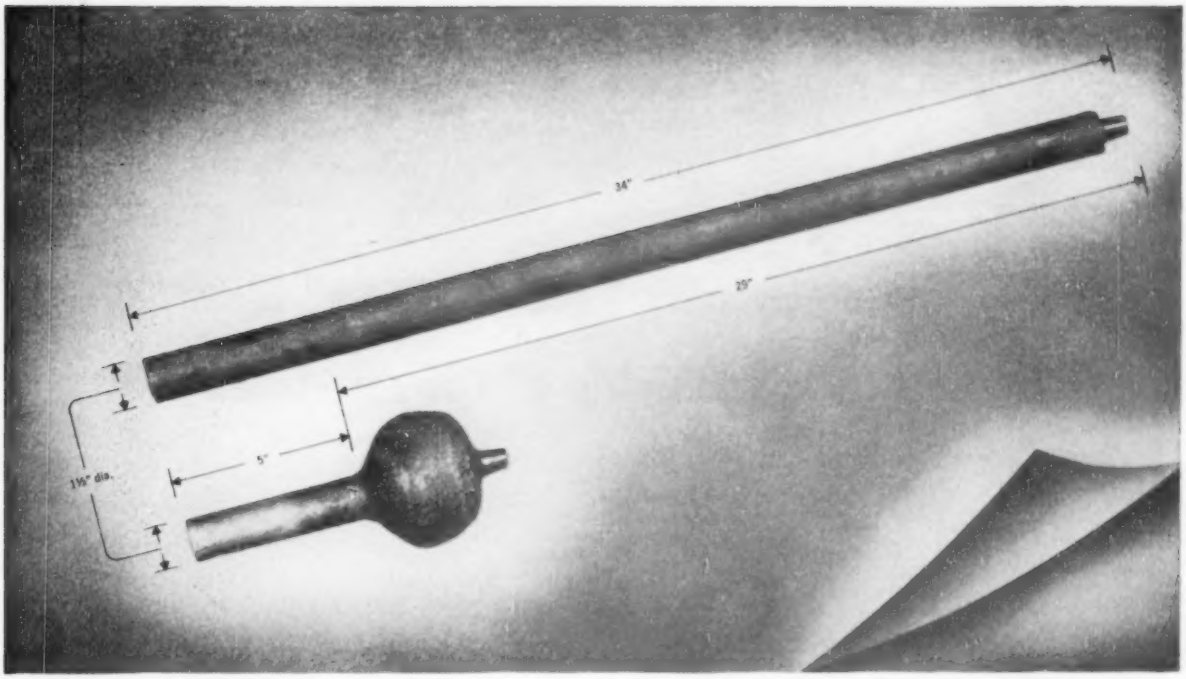
Perfected by Chemical Development Corp., Danvers, Mass., as CD Mold Release B-2, the paste is reported to be insoluble in the resin, quick drying, non-running and non-sagging under very high temperature, and to possess a high flash point.

The material is said to have proved very effective in producing a smooth finished product from aluminum molds. It does this by filling the pores in the aluminum.



AIR CONDITIONING PANEL

New time-savers at Lockheed Aircraft Service, Inc., are these ready-made air conditioning panels, shown being checked prior to installation on an incoming aircraft at the company's Burbank, Calif., facility.



UPSETTING some old ideas as to the size of UPSETS!

Any good forging handbook will tell you that unsupported steel can be upset only three diameters. But today's new forging techniques at UTICA have revised that. As example, 29" of this Inconel X 1½" bar were upset into the bulb on the end. This bulb, after precise forging and finishing, will become a very high speed turbine wheel with integral shaft.

UTICA electrical upsetting gives special advantages

Today both old and tough *"new"* metals are being upset—on a production basis—in UTICA's battery of upsetting machines. Many special forging advantages result—and unique product design gains too. Primarily the upsetting brings greater strength and ruggedness through controlled grain flow. It also makes new designs possible—designs previously impractical. Most important of all, it drastically reduces not only material costs but machining time and costs as well.

A product of the UTICA "Quality First" program

This is just one development in the long range UTICA program—which combines new methods and new machines to mass produce quality forgings...accurate to a very few thousandths... many produced from the *"new"* hard-to-handle metals. Today UTICA production covers jet blades and other defense items—perhaps tomorrow we can serve you with some of the great forging advances developed during the past few years.

Jobs available for technically trained personnel.

Our new folder "File Facts on Precision Forgings" outlines UTICA'S methods and facilities. Send for your free copy today. No obligation.

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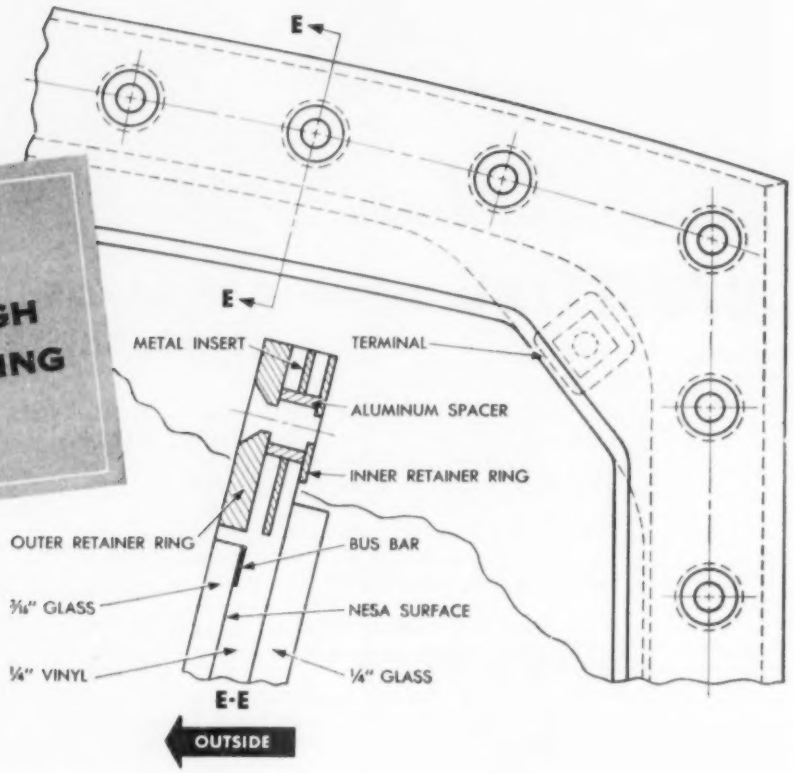
How electrically-heated "NESA" Glass is used in windshields of Convair-Liner 340

A report from

THE PITTSBURGH AIRCRAFT GLAZING FILE



PREVENTION of ice formation, freedom from fogging and frost, and maximum resistance to bird impact are designed into the windshields of the Convair-Liner 340 through the use of electrically-heated NESA-coated Glass.

These sections show you how Convair engineers and Pittsburgh Plate Glass Company technical representatives, working together, applied NESA Glass to the windshields. The "direct-view" (DV) window on the pilot side is NESA, too.

The NESA windshield consists of two pieces of tempered glass with a vinyl filler between. The inboard surface of the outboard glass is NESA coated and carries electrical current at relatively low resistance between bus bars and terminal. Heat dissipation is about 1,500 BTU/hour/square foot.

Pressure load is carried by the full-tempered inboard glass by transmittal through the vinyl to the outboard retainer ring, leaving the semi-tempered NESA Glass "free-floating" with as little stress as possible. Gentle warming of the plastic by the NESA coating imparts maximum bird resistance to the windshield.

Pittsburgh technical representatives will be glad to assist you with your aircraft glass or glazing problems, drawing upon experience gained in working closely with most of the nation's major aircraft companies. For complete information, write to Pittsburgh Plate Glass Company, Room 3394,632 Fort Duquesne Blvd., Pittsburgh 22, Pa.

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PITTSBURGH PLATE GLASS COMPANY

IN CANADA: CANADIAN PITTSBURGH INDUSTRIES LIMITED

RUGGED TERRAIN of Canada's Northwest is conquered by helicopters. Note landing platform (left center) at Twin Peaks camp.

Okanagan Cuts Mountains Down to Size

By George L. Christian

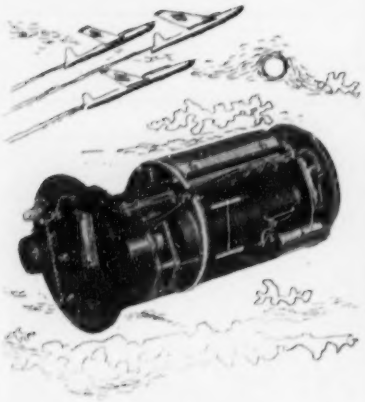
Kemano, B. C., Canada—Making molehills out of mountains. That is the way Carl Agar describes the work of his Okanagan Helicopters, Ltd., of Vancouver, British Columbia.

A brilliant example of how Okanagan's copters cut mountains down to size is Aluminum Company of Canada's vast, half-billion-dollar hydroelectric power project here. Probably nowhere else in commercial operation has the helicopter performed so well under difficult conditions. It has opened otherwise inaccessible areas for development and expansion, saved time and lives.

This operation is probably the first use of helicopters as a working man's vehicle. The machines provide regular commuting service for engineers and riggers, carpenters and cooks, carrying them to and from their daily work in the rugged country.

The egg beaters took on all the jobs thrown at them. At its largest, the fleet was composed of three Bell 47Ds owned

SIKORSKY S-55 carried all materials and supplies for Kildala Pass camp.



Methods,

process engineers . . .

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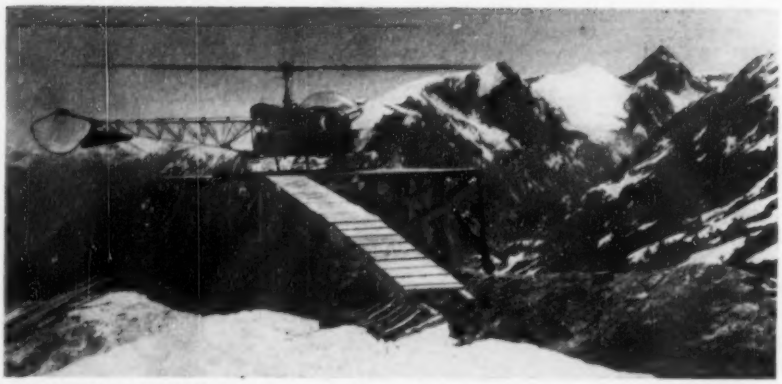
Openings. In Minneapolis and Philadelphia.

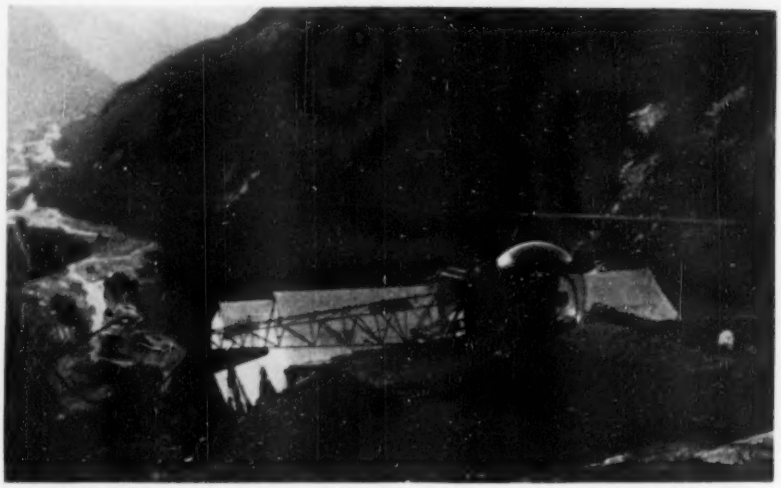
Write J. A. Johnson, Engineering Placement Director, Dept. AW-11-184, Honeywell, Minneapolis 8, Minnesota. Learn in detail about the significant opportunities at Honeywell. And be sure to ask for our new book, "Emphasis on Research."

MINNEAPOLIS **Honeywell**

First in Controls



WOODEN PLATFORM, not as precarious as it looks, serves one camp, while . . .



CLOTH CARPET laid on the ground is landing field at another mountain site.

TEST INSTRUMENTS in 50 ft. of snow are checked by copter in winter landing.

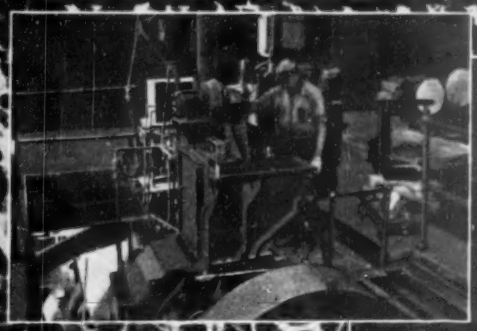
by Okanagan, plus one 47D, three 47Dls and two Sikorsky S-55s owned by Alcan and operated by Okanagan.

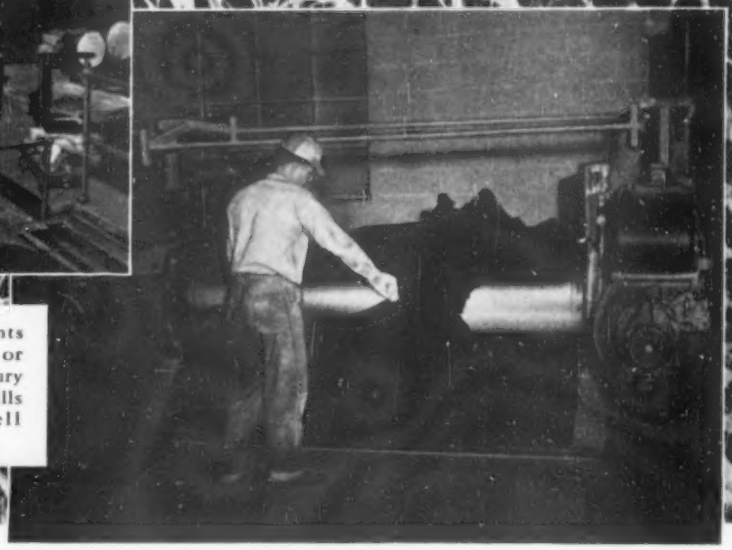
The helicopters' primary job was to lug supplies to inaccessible camp sites scattered amongst the sheer-sided mountains and untrodden valleys in which Alcan is hewing its mighty project (which includes a vast aluminum smelting plant at Kitimat, 50 miles to the north).

Part of the helicopters' chores lay in helping to establish and supply camps from which men are building power transmission lines and towers for the project.

► **Lot of Everything**—But the helicopters did a lot of everything. At the very outset of the project, Agar, operations manager of Okanagan, undertook the initial survey of the Alcan site. He cleaned up in 10 days a task which local

RUBATEX *makes Rubber Behave!*





Compounding ingredients are blended with natural or synthetic rubber in Banbury mixers or on mixing mills for uniformity of cell structure.

Closed cells are responsible for the structural strength and superior physical properties of Rubatex—not possessed by ordinary sponge rubber with open coarse cells which are wide open to oxygen and moisture.

Rubber has a stubborn "memory" and constantly strives to return to its original character. Rubatex temporarily knocks the "fight" out of rubber by blending it with specially developed compounding ingredients on mixing mills or in Banbury mixers to assure a uniformity of cell structure throughout.

When rubber regains its wind, Rubatex hits it again by blowing nitrogen under pressure into the precured sheets — forming millions of nitrogen-filled cells, permanently sealed with tough live rubber. Thus Rubatex reforms and transforms rubber into a material with a unique closed cellular structure that shuts out oxygen, heat, cold, moisture, dust and dirt . . . making RUBATEX far superior to other soft rubber materials for sealing, gasketing, cushioning, sound deadening, vibration isolation, and packaging applications.

In addition, RUBATEX is soft, pliable, easy to work with. It is available in natural and synthetic stocks in soft, medium, and firm form. Next time—check the advantages of RUBATEX first!

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- Moisture-proof seals
- Gasketing
- Vibration isolation
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- Bath and kitchen mats

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Write Dept. AW-11 Great American Industries, Inc., Rubatex Division, Bedford, Virginia.

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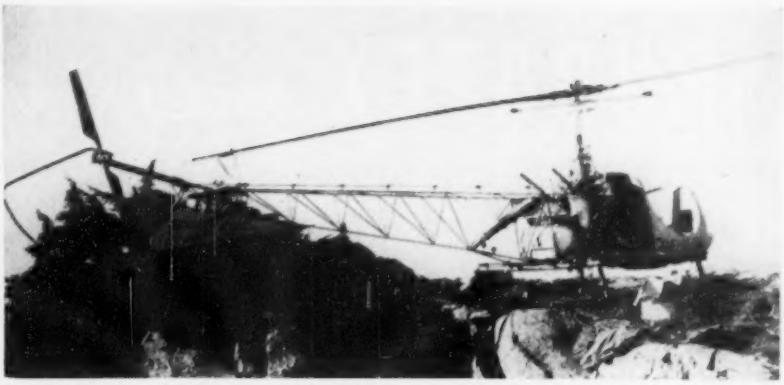


SPARE TAIL ROTOR is carried by Bell copter, strapped to side of boom. This is to enable mechanic to make quick fix if rotor breaks far from home.

KEMANO OVERHAUL base includes Okanagan's only covered maintenance facility.

observers say would normally have taken three years.

Another enormous time-saving job was performed by the copters when it came to working out triangulation for locating a water tunnel. The helicopters got the job done in six weeks. On foot the task would probably have taken 12 men two seasons.

And the list goes on. The machines flew at least five mercy flights, hauling men to safety with injuries ranging from missing fingers to broken backs.

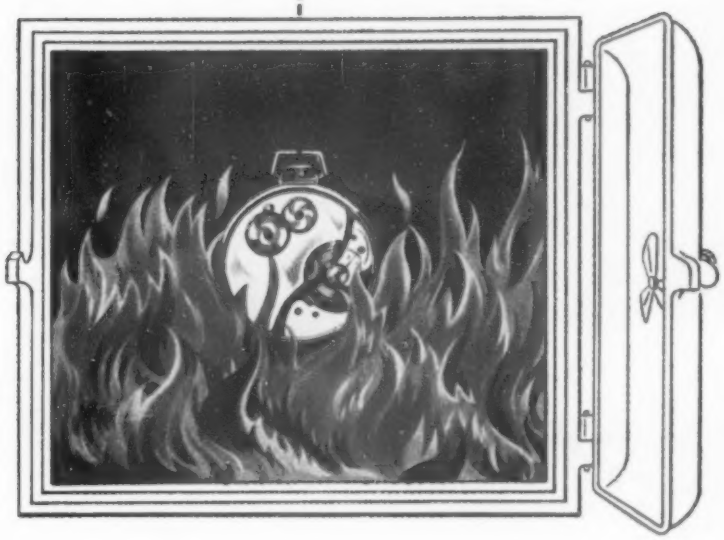
On a routine flight, pilot Fred Eilertson spotted a snow scooter overturned on Tahtsa Lake (water supply for Alcan's powerplant). Dropping down for a look-see, Eilertson found two badly injured men. He landed and ferried them one at a time several miles to East Tahtsa. The more seriously hurt man was flown an additional 100 miles to a hospital at Burns Lake. Without question, both men would have died had Eilertson not seen them, Agar says.

Once, when a party of engineers was anxious to start work on the Dala River as early as February, a massive ice floe blocked the boat's entrance. A helicopter, flying off a barge moored alongside the boat hurdled the ice floe and flew eight men and two tons of equipment from boat to camp site in five flying hours. Initial helicopter operations at the power site were from a barge anchored in Kemano Bay. The barge provided a landing spot for the machine and living quarters for pilot and ground crew. Quarters were cramped, but operations proceeded smoothly.

Okanagan's pilots scored another victory over the ice and snow of British Columbia. The sooner that frozen Lake Tahtsa could be opened to surface traffic, the more supplies could be brought in by ship and barge. So a copter was loaded with a mixture of lamp black and light diesel oil. This was sprayed in a 75-ft.-wide path the length of the 18-mile long lake. Object was for snow area darkened by the lamp black to absorb heat of the sun and melt faster than usual. The scheme worked and the lake was opened to surface transportation a month early.

▶ **Odd Jobs**—Some of the jobs required of the helicopters were risky, most were essential.

When transmission line camps (from Kemano, via Kildala to Kitimat) had to be established in May, there was still a lot of snow left at the altitudes where the camps were supposed to be built. Helicopters would fly in and select a



Want to "hang a Watch" in a furnace...and make it run?

Something as technically difficult *is* being done now. For instance, the "buckets" (paddles) and turbine rotor assemblies we make for aircraft jet engines.

These buckets have to stand up against 10,000 revolutions a minute and a flame 1400° hot. Yet, they are made to closer tolerances than many of the parts in your watch and your automobile.

To accomplish this, the Jet Division developed a special technique to finish-forge unusual tougher-than-steel alloys to accurate curves even smoother than glass...with no final machining required! And we helped develop the alloys.

You're probably planning a new product . . . or how to make a present one better, stronger, at lower cost. *Now is the time to call on the Jet Division for recommendations and technical advice.*

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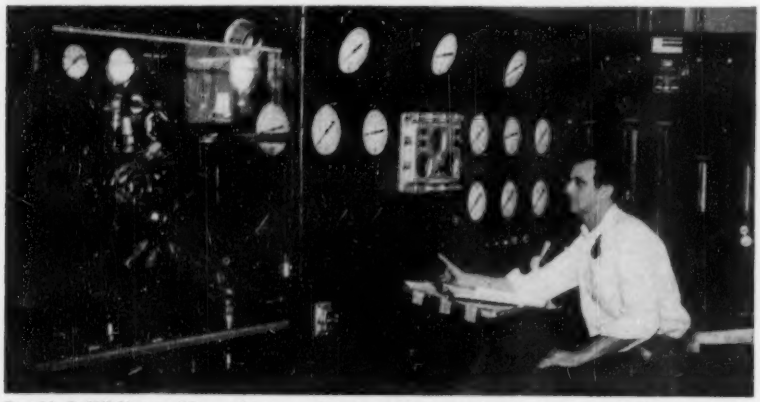
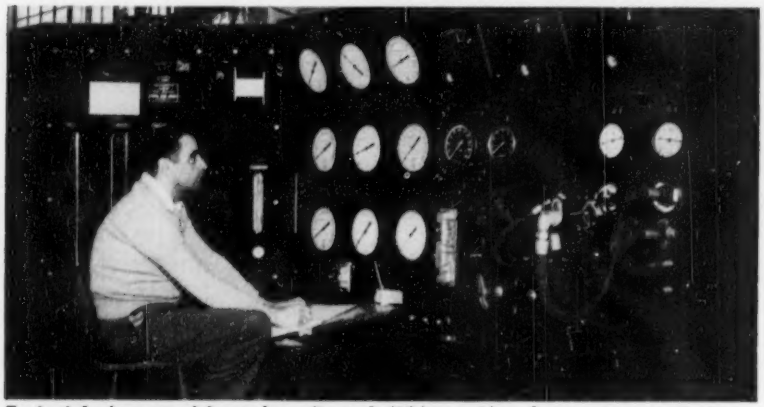
GREER TOPICS

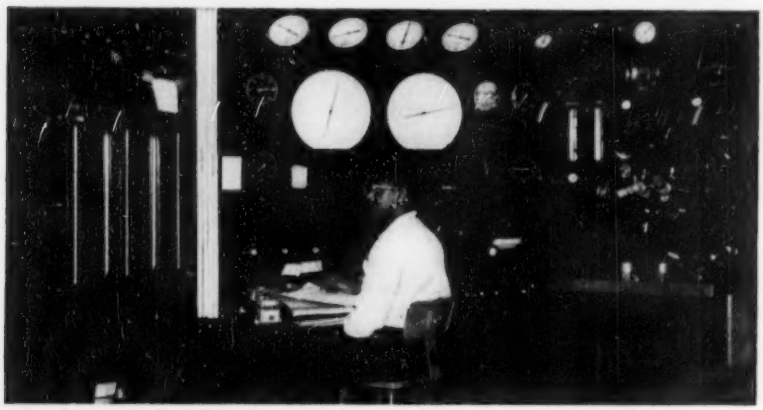
Important News of Aviation & Industrial Test Equipment



Pratt & Whitney Aircraft tests Holley fuel control with test stand shown above. This like other equipment on this page, was designed and built to order by Greer Hydraulics in close collaboration with Pratt & Whitney Aircraft and Greer's special staff.



To test fuel pressurizing valves, Pratt & Whitney Aircraft uses test stand above, designed and built by Greer to Pratt & Whitney specifications. In addition to this designed-to-order equipment, Greer produces an entire line of standard test machines.



After-burner fuel control is checked on this Greer test stand. Aircraft manufacturers like Pratt & Whitney Aircraft know that Greer equipment means highest order accuracy and dependability. The stands are designed and built by men with many years of experience in this very specialized field. Call or write Greer today to help solve your test and maintenance problems.

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Greer Hydraulics Inc. 454 Eighteenth Street, Brooklyn 15, New York

Field Offices: 1908 West Cermak Road, Chicago, Illinois • 25 South Main Street, Dayton, Ohio 2832 East Grand Boulevard, Detroit, Michigan • and sales representatives in all principal cities

CARL AGAR, Okanagan's general manager, delivers load of tower sections to summit of Kildala Pass in Bell copter.

site. If snow was too soft for a landing, a man would hop out with snow shoes, while the machine hovered. His job was to pack the snow hard enough to allow the helicopter to land. He also set up a red wind flag.

Helicopters then shuttled back and forth with loads of pre-cut lumber, then with carpenters and helpers. Soon a small-size wooden platform was ready to receive the copter.

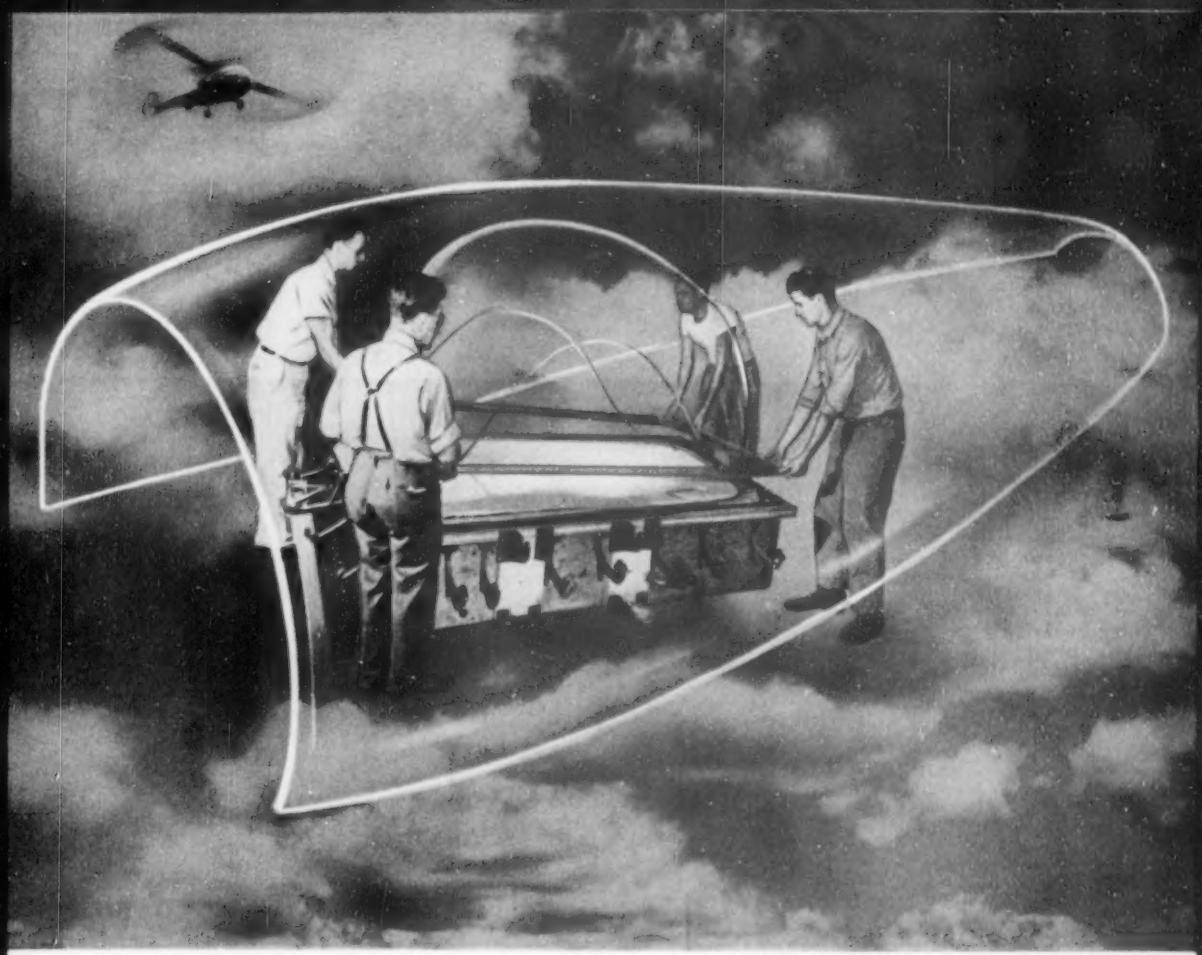
Once the platform was established, the machines settled down to hauling riggers and laborers 2,000 ft. above the valley floor. The minutes-long helicopter trip got the men to their working locations quickly and without subjecting them to a long, fatiguing climb. And an economic advantage was realized—instead of as much as 75% of the men's pay going for traveling time, only 8% was charged when using helicopters. This included waiting time during rush hours. As one rigger put it. "The helicopter is the answer to a rigger's dream—it's a lot easier to rig downhill than uphill."

Many operations were conducted at altitudes varying from 5,000 to 6,400 ft. where summer temperatures rose to 70F, giving pressure altitude readings of approximately 8,000 ft.

On the first provisioning flight to a new camp established at an altitude of 3,800 ft., the helicopter pilot was met by a frantic cook requesting rifle ammunition. Three bears had been killed the night before while raiding the men's tent. Only a couple of shells were left, and the number of bears remaining was unknown.

Just to round out the list of odd jobs, Pete Cornwall, one of the helicopter pilots, spent 10 days taking Fisheries inspectors and their staff around Tahtsa Lake to make sure the salmon population would not be harmed by changing the direction of water flow when the lake's eastern outlet was dammed.

► **Large Loads**—These are typical ex-



Behind the PLEXIGLAS... *Proper Fabrication*

PLEXIGLAS has become a by-word for canopies, noses, domes and windows of all types of aircraft because the material combines in optimum balance the properties of clarity, strength, formability and resistance to weather.

Of equal importance with these properties is the skill of fabricators who form flat sheets of the acrylic plastic into aerodynamic shapes, exercising rigid controls so that the clarity and strength of PLEXIGLAS are retained in completed enclosures. In addition, because of their intimate knowledge of the working characteristics of PLEXIGLAS, fabricators frequently assist with the design of transparent enclosures and edge attachments.

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50TH ANNIVERSARY OF POWERED FLIGHT

GIVING PILOTS

1923 Sperry high intensity arc revolving beacons and high intensity arc airport floodlights, installed at regular intervals, guided the first Air Mail night flights between Chicago and Salt Lake City. As night flying expanded, Sperry supplied 24-inch incandescent revolving beacons to light the airways.

"SECOND SIGHT"...

another Sperry first... 1923

With the development of powerful searchlights to light the airways 30 years ago, night flying became possible. Thus Sperry began giving pilots "second sight"—a project that has never ended. Among the major achievements are the Gyro-Horizon, giving the pilot an accurate artificial horizon when the natural horizon is blotted out by fog or darkness . . . the Directional Gyro, assuring a straight course, unaffected by magnetic disturbances that set magnetic compasses spinning . . . the Automatic Approach Control, that guides the aircraft along a precise path to the runway in response to signals from the instrument landing system.

Military, commercial and private planes depend on these and other precision Sperry equipment, either produced in Sperry's own plants—or by companies licensed to use Sperry patents.

TODAY, AS THEN, SPERRY LEADS THE WAY

Working with the Government's Military Civil Air Navigation Development Board and the U. S. Weather Bureau, Sperry engineers are now tackling one of the last remaining obstacles to routine instrument approaches under all-weather conditions—the lack of continuous accurate information for the pilot regarding *actual* weather conditions existing in the final approach area. When this problem is solved—as it will be—Sperry will again have contributed significantly in giving pilots "second sight."

1929 Lieutenant "Jimmy" Doolittle, in hooded cockpit of Consolidated NY-2 made first complete "blind" flight over Mitchel Field, Long Island. Using Sperry Gyro-Horizon and Directional Gyro, Doolittle took off, flew over 15 miles and landed "blind."

1937 Captain Carl J. Crane, Captain George V. Holloman and Raymond K. Stout, flying an Air Corps Fokker YIC-14, made first completely automatic landing using Sperry Automatic Pilot and radio guidance.

1941-45 Sperry radar enabled Navy pilots to seek out and destroy enemy aircraft in the air—and submarines at sea. The Sperry-developed Klystron tube made such radar possible.

1953 Sperry engineers at their MacArthur Field Flight Research Base amass data on hundreds of "limited visibility" landings during the current weather research project.

Tomorrow, Sperry-developed radar, above, will be employed in storm warning, terrain clearance, collision prevention, and in navigating on radar beacons—insuring even safer flight and giving the pilot the ultimate in "second sight."

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One of a series of advertisements commemorating the Fiftieth Anniversary of Powered Flight

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The lift, the power, the drive . . . yes, the air-borne heart . . . of the YH-21 Piasecki "WORK-HORSE" Helicopter are delivered by the three transmissions shown here . . . the forward, mid and aft. For *this* kind of component fabrication, the best single manufacturing asset is the PRECISION for which *Steel Products* is famous!

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THE STEEL PRODUCTS ENGINEERING CO.

engineers and manufacturers • Springfield, Ohio

amples of the large loads shuttled by the helicopters:

• **A Bell lugged 19,300 lb.** of freight and seven passengers up the mountains to "Hanging Valley," so named because of its sheer-walled canyons, in 13 flying days.

• **A Bell flew 90 hours** in 28 flying days, carrying 151 passengers and nearly 10 tons of freight to wooden landing platforms, roughly 16x20 ft., perched 1,600 and 2,600 ft. above the valley.

• **A Bell carried 175 passengers** and over 18 tons of freight in slightly over 100 flying hours.

The Bells' biggest month was when four machines flew 872 passengers and more than 33 tons of freight in 357 flying hours—and all this with the crudest type of maintenance facilities and one small hangar.

The Sikorskys got into the act later, but also did their share. Hardly had the first S-55 arrived when a bulldozer, clearing away snow at Tahtsa, plowed through an oil line. Thousands of precious gallons were lost and the bulldozing would have come to a halt but for the S-55 which was put to work lugging 45-gal. drums of oil up to Tahtsa from the base at Kemano.

Later, the same machine hauled 52 passengers and over 17 tons of freight up the mountain in 32 hours.

Another chore was hauling 1,700-lb. aluminum tower sections, two-thirds as long as the helicopter, up the high valleys.

When the summit camp was opened at 5,500 ft., the helicopter kept it supplied by lifting in 123 tons in 116 hours. This represented 95% of all the needs for the camp, which accommodated 121 men. Among items lifted in the 15-mile flight were drill rods, stoves, walk-in refrigerators (in knock-down form), tents, beds, lumber, food, kitchen sinks and dynamite.

▶ **Cement Mixers Too**—An S-55 flew right into Alcan history by moving an intact cement mixer up the mountainside. Since the mixer was too big to fit under the machine, it was placed in a hole, out of which the copter plucked it. The machine was delivered the same way, into a hole prepared for it.

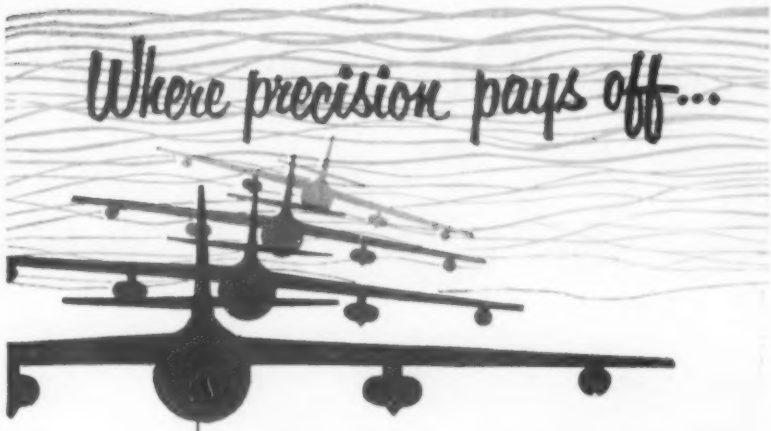
The S-55s carried average loads of 1,200 lb., sometimes inside, but often outside, slung in rigs or nets under the crafts' bellies. Maximum loads went as high as 1,600-1,700 lb.

Bells averaged 400 lb., with maximums hitting over 600 lb.

▶ **Handsome Job**—Here is a summary of the operations of the copter fleet:

The five Bells and two Sikorskys flew over 2,000 hours. By 1953, they had hauled over 1,000,000 lb. of freight and an uncounted number of passengers.

The following shows in another way



Accuracy as represented by integrating ranges of 300 to 1 is common to all modern flight simulators. But for reproducing the intricacies of supersonic flight the men who design and engineer Link Flight Simulators go further. A ten-fold increase in accuracy is built into Link ac analogue computer systems — which employ an electro-mechanical integrator with a 3000 to 1 speed range. And it really pays off! For example:

In order to produce realistic simulation for high speed flight, rates of descent as high as 30,000 feet per minute must be accurately computed. The conventional simulator integrating range of 300 to 1 cannot accomplish this without sacrificing accuracy at the slower speeds, e.g. — rates of descent less than 100 feet per minute. In Link's newest jet simulators, however, changes of altitude are computed over an integrating range of 3000 to 1, and thus accurately indicate rates of descent over the complete range of from 30,000 feet to as *low as 10 feet per minute!*

Equally important is the accuracy of dynamic performance which this integrating range provides. This provides the pilot with the actual "feel" of the controls in flight — making flight realism an inherent characteristic of today's Link trainers. *Precision pays off* — and nowhere more importantly than in training a pilot to make a controlled approach and instrument landing.

Link velocity servo-mechanism as used in the electro-mechanical integrations of the ac analogue computer systems of Link Flight Simulators.

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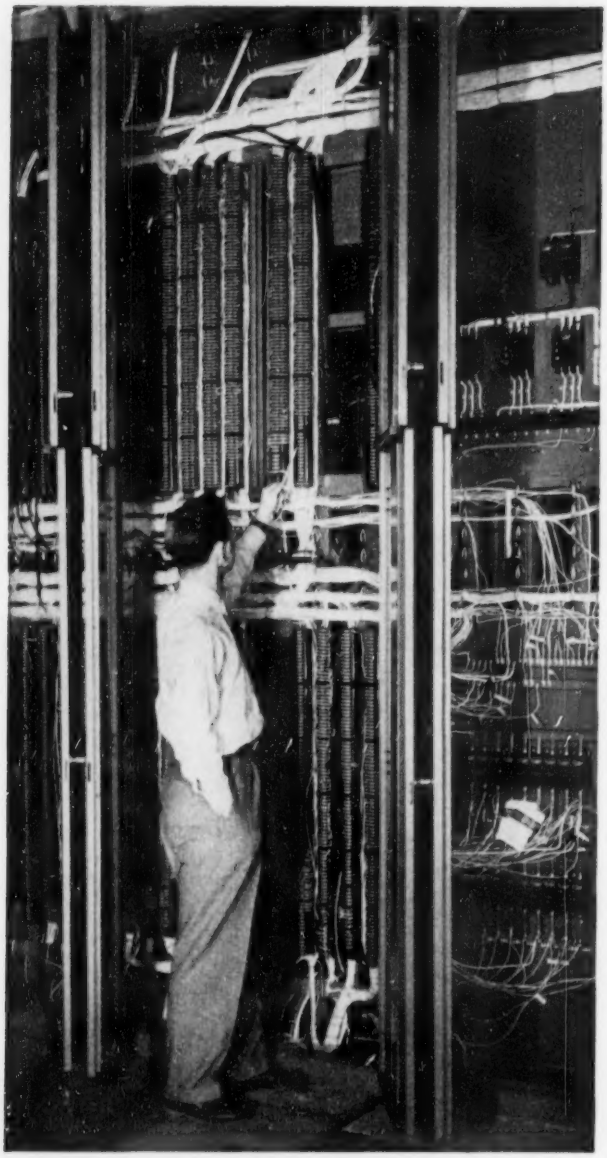
over 100 miles of cosmotron

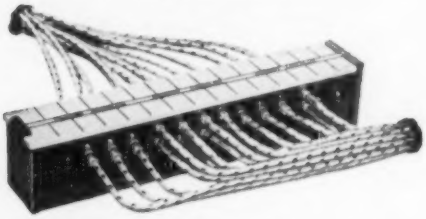


Bank of Control Terminals of Brookhaven Cosmotron, with compact, trouble-free wiring made possible by use of three different types of Burndy connectors.

52-21

Burndy connectors are integral units of the Cosmotron electrical control panels . . . because Burndy combines *maximum electrical efficiency* with *mechanical strength* that withstands the most severe stress and vibration. What's more, in the over 100 miles of wiring, hundreds of thousands of electrical connections were made largely by *electricians without special training*—because Burndy connectors rely on *engineered design* to insure stable, secure connections.

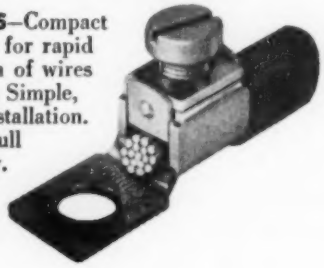
Naturally, Burndy is very proud to be part of the Brookhaven Cosmotron —and equally proud of our myriad everyday jobs in utilities, industry, manufacturing, general service.



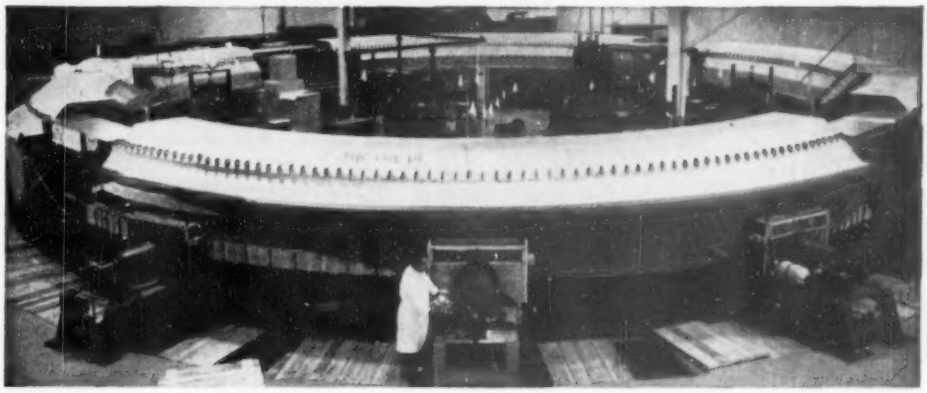
CRABLOKS—Quick-connect, quick-disconnect terminal blocks, placed end-to-end, provide multiple secure terminal connections in small space.

HYLUGS —Indent-type terminals—with matched Burndy tooling—provide secure, uniform, low-resistance connections, easily installed and inspected.

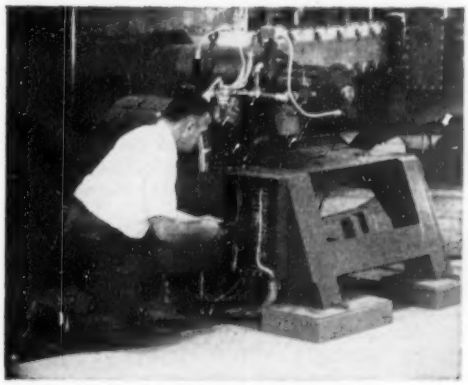
SCRULUGS—Compact connectors for rapid termination of wires and cables. Simple, one-tool installation. Maintain full re-usability.



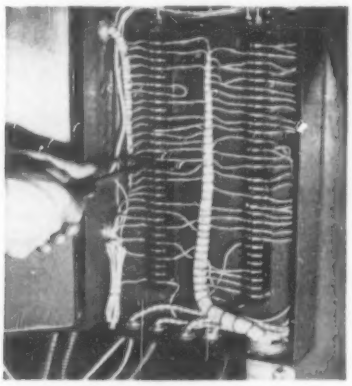
circuits
connected by BURNDY



Cosmotron at Brookhaven National Laboratory, Upton, L. I. World's most powerful atomic accelerator utilizes 40 million watts, accelerates nuclear particles to 170,000 miles per second.



View of the Cosmotron, showing diffusion pump, with terminal box in foreground.



Terminal box at left with Burndy Crabloks and Hylugs.

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with different diameters, with 8-branch and 4-branch "pine tree" slots, were **BROACHED WITH THE SAME BROACH!**

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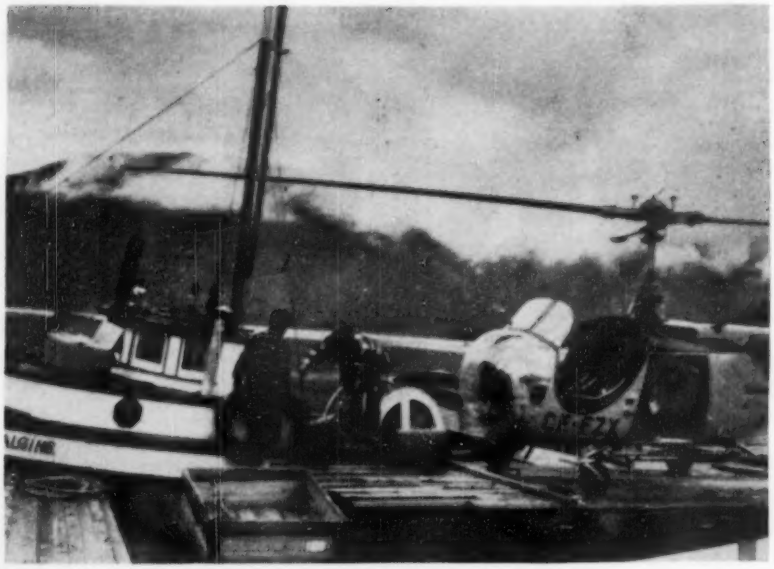

BARGE served as floating base during early development of Kemano area.

how much work two helicopters were able to accomplish up in the North Country, almost 500 miles away from civilization.

• **Bell 47D.** Number of trips, 235; number of passengers, 352; passenger weight, 65,364 lb.; baggage weight, 9,043 lb.; freight weight, 48,478 lb.; flying time, 135:10 hr.

• **Sikorsky S-55** (no co-pilot). Number of trips, 95; number of passengers, 232; passenger weight, 40,964 lb.; baggage weight 12,040 lb.; freight weight, 100,089 lb.; flying time, 54:45 hr.

► **Not Easy**—This work was far from easy. Okanagan pilots, lounging in a trailer parked in the Kemano camp named "Wash-Wash," told AVIATION WEEK some of the problems of flying around the fjords of northern British Columbia. Bill Brooks pointed out that mountains provide a poor and jagged horizon to use as a reference point. Very often snow-capped banks and peaks blend perfectly with the sky and there is no horizon at all. Moreover, snow destroys perspective, making flying through snow-covered passes and effecting snow landings ticklish. Senses of speed, height and perception have to be readjusted to meet the occasion.

Sudden gusts and downdrafts can be so strong that the pilot cannot make a controlled landing. Conversely, such strong updrafts have been encountered that helicopters gained altitude in spite of anything the pilot could do.

Okanagan's pilots work hard. Example is one who flew for 13 consecutive hours without respite. He carried 12 passengers and over two tons of freight to the 5,200-ft. camp. He made over 40 takeoffs and landings in that one day.

► **Few Mishaps**—Mishaps are few, especially considering the rugged conditions and terrain.

Once a survey crew member walked into the tail rotor of a Bell, putting both himself and the machine out of commission, neither permanently. Immediate results were two-fold: Workmen learned respect for the machine's whirling blades, and spare tail rotors were subsequently strapped to the helicopters' booms to make quick replacement possible should a rotor again be broken at an inaccessible spot.

Another Bell suffered a structural failure and made a forced landing at the summit camp. It had to be dismantled and flown out in sections.

The Bells' engines turned in a remarkable record of reliability. In all the flying the machines did in 2½ years of service under the most strenuous type of operation, only one engine failed (because of detonation). The craft made a safe autorotation landing and was back on the job the following day.

The S-55s had a couple of close shaves. On one, the tail rotor skin started to peel away during flight. The pilot had to use full rudder to bring her in, but made it safely.

The only other trouble experienced by Okanagan on the two Sikorskys was a transmission failure. In this case the shaft portion of the hub and shaft assembly let go. But no damage resulted because failure was found in time when chips were noticed in the oil sump finger screen.

Okanagan men feel this good record for the machines is a tribute to their excellent design and sturdy construction. The hours accumulated on the Bells range from 650 to 1,880. The S-55s have run up totals of 240 and

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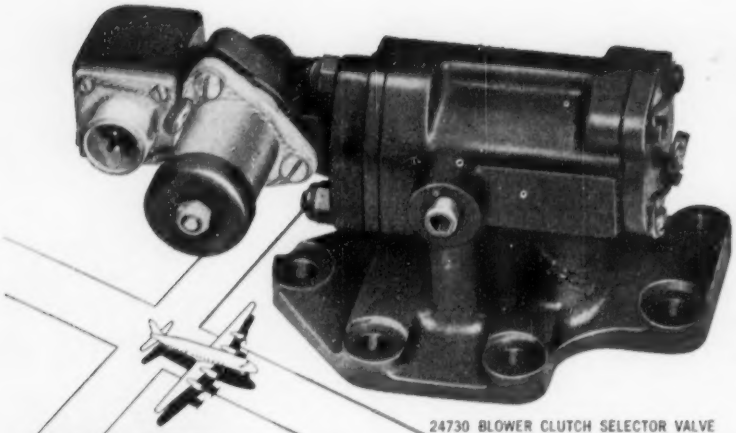

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Operating fluid: Engine Oil.
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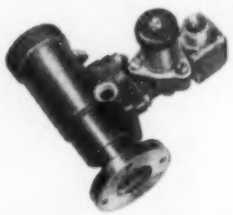
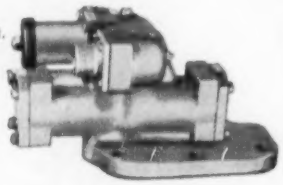
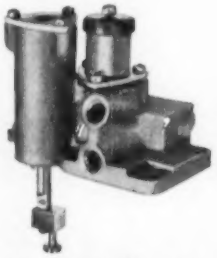
Solenoid: Single-coil, internally grounded.
Electrical Range: 18 to 30 volts dc.
Current drain: 0.5 amp at 24 volts.
Corrosion resistant construction.

24730 BLOWER CLUTCH SELECTOR VALVE
For use on Pratt & Whitney R-2800 engine.
Controls operation of two-speed supercharger. Electrical control is positive in action. Current failure returns valve to normal position, placing supercharger in low gear.
Weight: 2.2 lb.

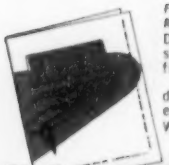


24793 SUPERCHARGER CONTROL ACTUATOR
For use on Wright R3350-30 engine.
Provides positive control of two-speed supercharger with complete immunity to pressure surges in the operating fluid. Durable and dependable.
Weight: 1.75 lb.





26153 SUPERCHARGER CONTROL VALVE
For use on Pratt & Whitney R4360-63 engine.
Directs oil flow from pressure supply to high blower. Rated flow—9 gpm.
Built-in stamina provides dependable performance under extreme vibration conditions.
Weight: 1.9 lb.



25805 SUPERCHARGER ACTUATOR
For use on Wright R1820-103 engine.
Converts hydraulic pressure to mechanical push-pull actuation. Electrically controlled. Combines reliable operation with proven design . . . rugged construction.
Weight: 1.95 lb.

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GIRDERS and lumber were hauled to mountaintops in homemade rig attached to S-55 underside (see below).

360 hrs. respectively.

► **Okanagan Improvisation**—Okanagan's men—pilots and ground crew alike—did some clever improvising to make their big and little helicopters as efficient as possible for the unprecedented job they were being asked to do.

• **Lumber loader.** The 1,200-1,400-lb. bundles of lumber the S-55s swung up the mountainsides were carried with grapple slung to the underside of the fuselage. Trick was for main grapple hook to pick up the load asymmetrically with front end light. As the machine picked up the bundle, front end canted up and then came in contact with a cable strung athwart ship between the craft's front wheels, imposing about a 300-lb. load. This actuated a microswitch which turned on a light in the cockpit to tell pilot that load was ready to lift away. As helicopter took off, a ground man centered load longitudinally. It remained in position because pressure on front wheel cable took up its slack, causing front end of load to rest in a "V" of its own making. With this rig, Sikorskys took 17 sec. to pick load up and get underway.

• **Bear paws.** Landing helicopters on soft snow at first posed a problem because of their tendency to sink in. So Okanagan's crews devised perforated dural plates, called "bear paws," which, when attached to the Bells' skids, effectively keep the machines from sinking into soft snow. Entire rig weighs about 12 lb., but this includes a 30-in. rearward extension of the landing skids to keep the tail rotor out of the snow. On the S-55s, ¾-in. plywood bear paws support the machines' wheels on snow.

• **Cargo carriers.** Okanagan claims it originated a method of mounting heavy seine net cargo carriers on a removable, tubular frame that doubles as a stretcher. The 6x2-ft. carriers are mounted between the Bells' landing skid cross tubes where they serve as cargo carriers.

► **High Efficiency**—Watchword at Okanagan's Alcan base is efficiency—effi-

Could It Fly Without Cherry Rivets?

Certainly!

Without any doubt, the fastest, piston-powered airliner—American Airlines' new DC-7 Flagship, could have been built (with some modification) without blind rivets. Cruising at 365 miles per hour in the quiet comfort of the luxurious cabin, you, as one of the 60 passengers on the nation's first *nonstop* transcontinental service, would never know the difference.

Yet, Douglas engineers will tell you that the thousands of Cherry Blind Rivets used in the DC-7 make it possible to accomplish fastenings which otherwise would be difficult or impractical. For example, the clean, aerodynamic design which contributes to the high speed of the DC-7 stems from the use of Cherry Rivets in fastening components of control surfaces and other streamlined sections.

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Cherry Rivets are installed by one man from one side of the work by a special gun which pulls the stem into the hollow shank—upsets the end on the blind side—firmly clinches the rivet in place—fills the hole—all in a split second. Bucking is eliminated.

Cherry Rivets are but one group of the 10,000 types of fasteners and special cold-formed parts produced by Townsend in its several plants. As "The Fastening Authority," Townsend will help you speed production—produce better products—reduce costs by applying its method of manufacture to your fasteners and small parts. Special bulletins describing Cherry Blind Rivets and other Townsend products and services are yours for the asking.

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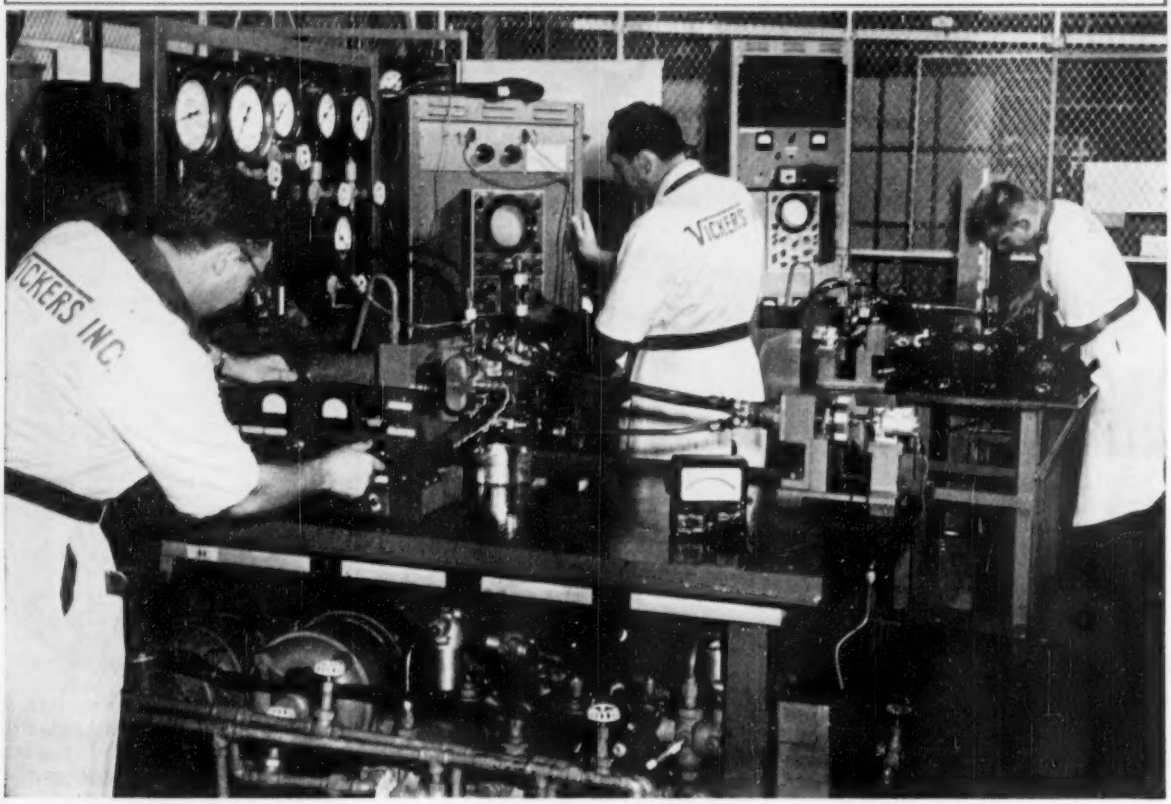

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

ciency of every component of the helicopter. For instance:

• **Glassy blades.** To obtain the highest aerodynamic efficiency from the rotor blades, Okanagan developed its own method of putting a glassy, almost mirror-like finish on the blades' surfaces.

In preparation for refinishing, the crews took a new blade as finished down as far as possible without damaging the unit. Then surface of blade was filled in with surfacing putty and rubbed smooth. On this surface, red oxide primer was built up to 4-6 coats until the blade's surface was perfectly smooth. Each coat was carefully rubbed down before application of next coat. Blade was then finished with 2-3 coats of lacquer, each rubbed down before next layer was applied. Last coat was thinned down to the consistency of a wash. Result was a glassy blade.

• **Swish vs. clunk.** Okanagan's ground crew said: "We really have to be fussy with the Bell's swash plate." They hold the gimbal ring support pin tolerance to within 1/10,000 in. Result is a smoother running machine with greatly reduced feed-back to the cyclic pitch control. As the boys put it: "We get a 'swish' instead of a 'clunk' as the blades go round." Absence of feed-back makes flying a lot easier, the pilots say. A ride from Camp #8 to a platform at the 2,200 ft. level showed this reporter what a difference the cleaned-up rotor made. The pilot's cyclic pitch control hardly vibrated at all.

▶ **High Lift**—Maximum lift is another "must" for Okanagan. So the boys went over the machines with a critical eye to anything on the craft that could be removed to save weight. And they were talking in terms of ounces.

They replaced the maple blocks at the ends of the landing skids with cedar —saving was 3-4 oz. per block.

Shorter bolts were sometimes substituted where possible to save another ounce or two.

This careful stripping paid off. When the mechanics were through, they had lightened each machine from 50-80 lb.

▶ **TCP and Plugs**—Okanagan, like other Bell operators, finds Shell Oil's TCP (tricresyl phosphate) anti-plug fouling fuel additive a must. Okanagan uses 4 cc. of TCP to a gallon of fuel. Pilots carry spare TCP in old medicine bottles, graduated in 20-cc. increments, each good for 5 gal. of gas.

Okanagan stresses that a carefully laid out and executed preventive maintenance plan contributes much to its trouble-free operation. But the men add: "The machines have to be good in the first place to withstand the beating they take in the long, everyday climbs to 5,000 ft. and above, and operating from dirty, dusty spots."

One minor problem the maintenance

LEWIS

Selector Switches

FOR RESISTANCE THERMOMETERS
AND THERMOCOUPLE THERMOMETERS

EACH SWITCH HAS "OFF" POSITION PLUS NUMBER OF POINTS LISTED.

Points	Size	Switch Part Numbers Thermocouple Type	*3 Wire Resistance-Thermometer Type
2	2"	11S2	36SR2
3	2"	11S3	36SR3
4	2"	11S4	36SR4
5	3"	10S5	37SR5
6	3"	10S6	37SR6
8	3"	10S8	37SR8
9	3"	10S9	37SR9
10	3"	10S10	37SR10
12	3"	10S12	37SR12
16	3"	10S16	37SR16
18	3"	10S18	37SR18
20	3"	10S20	37SR20
24	4"	27S24B2	38SR24
28	4"	27S28B4	38SR28
40	4"	38S2C	

*Resistance thermometer switches are provided with a safety resistor on off position.

2" SIZE

3" SIZE

SPECIAL SWITCHES

No. 37S6C2, Four "4 Point and OFF" thermocouple switches combined in one 3" case.

No. 9S5, Single Pole, Four Point Instrument Switch in 1¼" round case.

No. 44S4, Six Pole, Double-throw Instrument Switch in 2½" round case, one hole mounting, ½-32 threaded bushing.

4" SIZE

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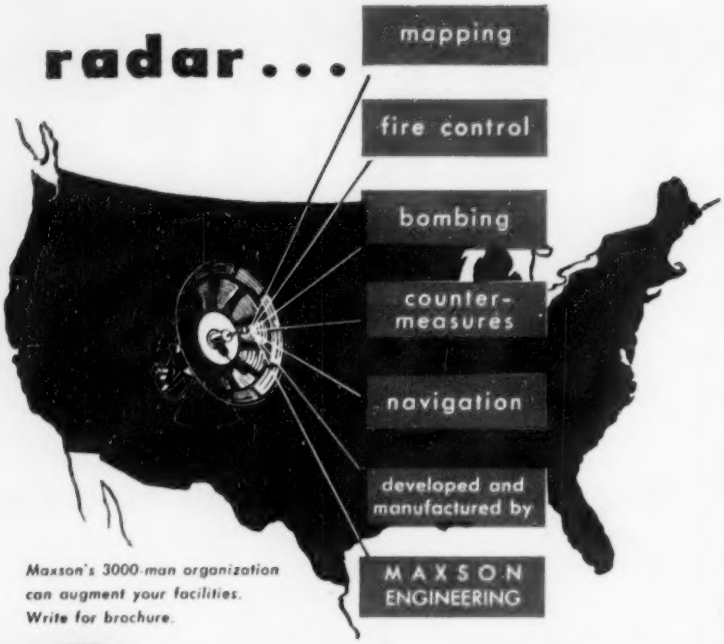

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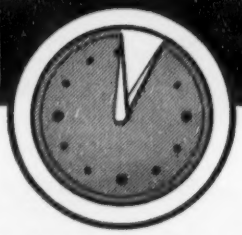

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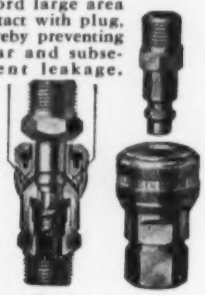
Locking pins in Hansen Push-Tite Coupling Socket afford large area contact with plug, thereby preventing wear and subsequent leakage.



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Birmingham	Detroit	Milwaukee	San Francisco
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men complained about was bubble trouble on the Bell. Bubbles crack easily and have to be laced together with wire. But it is not entirely the bubbles' fault, the men concede. When helicopters climb out of the warm valleys, bubbles are often subjected to sudden temperature drops of as much as 30 degrees. This is not good for the large area of unsupported plastic.

▶ **Maintenance Shed**—Okanagan does its maintenance in a wooden-frame corrugated hangar on the outskirts of the main camp at Kemano. Dimensions are 75 × 31 ft., with a 20-ft. ceiling.

The record of the helicopters won for Carl Agar Canada's coveted McKee Trophy for his development of mountain-flying techniques as applied to helicopters.

RAMP OUTLET houses hose for centralized air conditioning setup.

Planes Conditioned From Central Plant

A centralized air conditioning setup at Greater Pittsburgh Airport serves not only the administration building, but up to 31 planes at a time on the field's apron.

Outlets on the parking apron can be hooked up quickly to an aircraft's ground air conditioning outlet, and filtered air piped into the phone's cabin from the central air conditioning and heating system.

Fuel and oil are also supplied from the pits that contain the air conditioning hose.

The equipment in the administration building is made by the Sturtevant division of Westinghouse Electric Corp. It includes 71 Westinghouse heating and cooling coils, 30 fans measuring 3 to 8 ft. in height, and nine Precipitron air cleaning units, designed to virtually eliminate dirt, pollen, germs and cigarette smoke.

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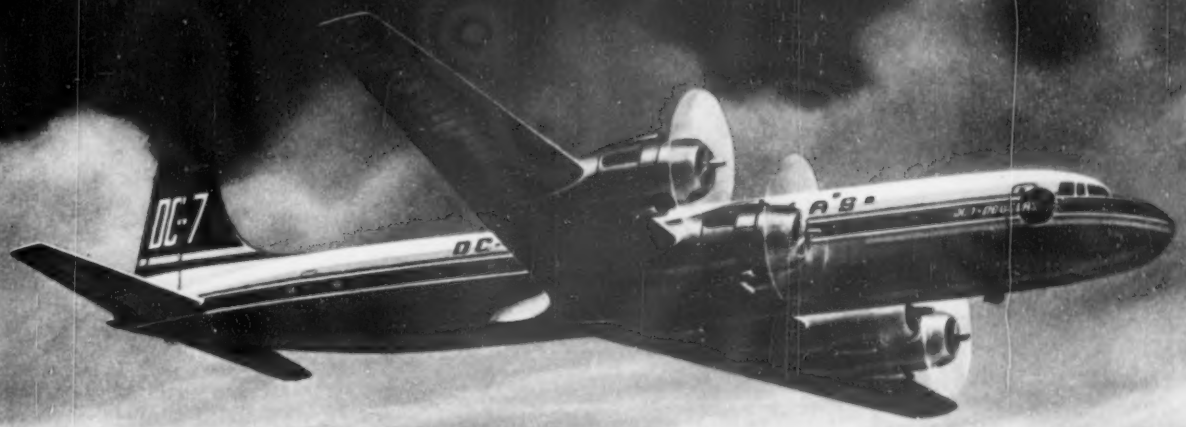
Age of Flight



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ANOTHER SOLAR CONTRIBUTION

New Canadian Line Pins Future on Coach

- **Pacific Western is first to ask for tourist permit.**
- **Carrier made up of three merged bush operations.**

Vancouver, B. C.—A lusty, new airline was born here recently.

Christened Pacific Western Airlines, the young company lost no time in making itself known. It became the first Canadian carrier to apply for a permit to operate aircoach service within the Dominion. And it seeks to operate increased service north of here, principally to settlements on Vancouver Island.

▶ **30% Reduction**—PWA has applied to Canada's Air Transport Board to operate two 48-seat Bristol Wayfarers (passenger version of the Bristol Freighter) from Vancouver to Winnipeg, a distance of approximately 1,300 miles. Proposed fares would be sliced about 30% below existing first-class rates. The nonscheduled, Class 2 flights would stop at the larger prairie cities of Calgary, Edmonton, Saskatoon and Regina. PWA proposes that the flights be on at least a daily basis.

▶ **Noncompetitive**—PWA's proposed service will be noncompetitive, says F. Russell Baker, veteran Canadian bush pilot and vice president and general manager of Pacific Western.

"Pacific Western Airlines is not interested in competing with TCA and CPA or in becoming a luxury type of airline furnishing a first-class standard of service," he explained.

"We believe our future lies in the movement of passengers and goods in high-density aircraft, without the fancy trimmings and frills associated with Class 1 Schedule carriers. We are out to provide a service at the lowest price possible consistent with safety standards in order that the people of western Canada who cannot afford first-class fares or have not the time or the health to undertake a journey by day coach or motor coach, may travel by air."

▶ **New Traffic**—Baker added: "We anticipate that our service will tap an entirely new source of traffic and that it will have no detrimental influence whatsoever on the traffic presently handled by the existing carriers.

"Pacific Western Airlines is not considering aircoach operations east of Winnipeg and expects that a Winnipeg or eastern Canada operated may institute a similar service from Winnipeg east."

RUGGED TERRAIN characterizes route PWA flies "without the fancy trimmings."

A second bid for Dominion aircoach service was made recently by Trans-Canada Air Lines. TCA proposes inaugurating service with high-density North Stars Feb. 1, 1954.

▶ **Solid Background**—PWA says it has the background, knowhow and personnel necessary to operate the proposed new services.

Baker probably is Canada's senior pilot, having logged more than 15,000 hr. (He was awarded the U. S. Air Medal by the late President Roosevelt for heroic rescue of crews of three bombers

forced down in Yukon territory during a wartime flight to Alaska.)

He started his airline as a bush operation in 1946 with a staff of one and a Beech 17. He named his company Central British Columbia Airways, Ltd.

In 1953, Baker bought the licenses and facilities, but not the equipment, of three local air services: Associated Air Taxi Service, and Associated Aero Services, both of Vancouver, and Port Alberni Airways, of Port Alberni, Vancouver Island. He merged these with CBCA and Pacific Western Airlines was born.

Today he has a fleet of 24 planes, more than 100 employes. He has hangar facilities at Vancouver International Airport and offices downtown. His 1952 revenue: $1 million.

► **Overhaul Facilities**—Although PWA currently sends its R985 and R1340 engines to Pratt & Whitney Aircraft of Canada for overhaul, it does its own airframe, accessory and instrument work. In one of its hangars here a 1928 Fairchild 71 had just been given a complete overhaul and re-covering job and was being spray-painted brilliant yellow, characteristic of the North Country. The old Fairchilds still are popular in the bush country.

► **Other Application**—PWA is ready to expand in other areas. It has a second application before the ATB to operate a Class 3 specific point service from Port Alberni up the coasts of Vancouver Island.

PWA proposes to serve points 12½ miles on either side of a straight line drawn between Port Alberni and such towns as Tofino, Sydney Inlet, Muchalat, Nootka, Tahsis, Zeballos and Chamiss Bay. Flight frequency would be regulated by public demand. The service would benefit the logging industry, which has many camps on Vancouver Island, and residents of isolated communities.

Rates would be levied on a per passenger and a per pound basis.

► **Trials & Tribulations**—Baker's success has not been easy. Example: The battle with the Air Transport Board to allow him to compete with Queen Charlotte Airlines' operation (AVIATION WEEK Sept. 7, p. 72) to the "Three K" area, Kemano, Kildala and Kitimat. This is the site of the half-billion-dollar power generating, aluminum smelting plant being cut from British Columbia wilderness 500 mi. northwest of here.

QCA originally was accorded the route from Vancouver to Kemano-Kitimat to fly in construction workers for the aluminum project, according to Pacific Western. In 1951, PWA's predecessor, CBCA, began competing with QCA. By 1952, PWA said it handled more than 90% of the Vancouver-Three K traffic. In 1953, PWA wanted to increase its flight frequency between the two points, but ATB delayed action until June 11.

Pacific Western Airlines*

Year	Miles flown	Hours flown	Passengers carried	Pass.-miles	Goods carried (Lb.)
1949	179,013	1,680	532	78,962	19,699
1950	289,312	2,869	1,858	183,643	113,021
1951	766,162	7,538	10,950	1,407,357	549,035
1952	1,518,765	14,535:55	21,902	5,290,083	519,290
Totals	**2,753,252**	**26,622:55**	**35,242**	**6,960,045**	**1,201,045**

* Operating as Central British Columbia Airways, Ltd. until 1953.

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• TRANS-CANADA AIR LINES • TRANS WORLD AIRLINES • UNITED AIR LINES • "VARIG" BRAZILIAN AIRLINES

PWA FLOATPLANE TRIO is tied up to dock at typical settlement served by carrier.

On June 30, ATB refused PWA permission to renew its three-year contract with aluminum project contractor, Morrison-Knudsen. M-K insisted that PWA live up to its contract, but ATB ruled that this would be illegal. M-K decided to send its traffic by boat, to the loss of both airlines. Then ATB offered to reverse its position and allow PWA to enter a new contract with M-K under new provisions, giving PWA more leeway. But M-K had not entered into any new contracts at this writing.

▶ **Into the Future**—Here is how Baker summarizes his future plans: "I want to retain my position as 'Canada's largest contract carrier.' On this network, I plan to superimpose a scheduled operation which will grow as rapidly as acquisition of licenses and new, larger, more modern equipment will permit."

When Baker started his one-man, one-plane airline, he was concerned primarily with charter operations. He hauled supplies and a few passengers into the North Country and did some forestry flying.

▶ **Tough Flying**—Flying in north Canada was not easy. There were no navigational aids and the weather was (and still is) dirty. When searching out new routes, several planes keep in radio contact with each other. One or more planes often are forced by bad weather to land on lakes or inlets. Then they must wait for the weather to clear because IFR is impractical in the Bush Country. But Baker hopes to go into limited instrument operation this fall.

He also used to operate his floatplanes off snow. But the DOT (Canada's Department of Transportation) took a dim view of such practice and put a stop to it. Baker was forced to go to skis for snow operation.

In this connection, R. H. Laidman, PWA's operations manager, spoke highly of the laminated wood Ellis ski with brass-covered bottom. Advantage of the ski is its flexibility, allowing it to absorb a good part of the shock of running over rough snow without transmitting undue stress to the aircraft.

PWA uses Ellis skis in conjunction with M&C pneumatic pedestals. These units can be inflated to various pressures to take care of changing aircraft weights, varving terrain conditions, etc.

▶ **Old & New**—Like so many other Canadian aircraft operators, PWA flys many different types of aircraft. PWA's total count is 24 aircraft of nine different types. Oldest is a 1928 W33 Junkers.

PWA's current fleet: one Canso amphibian, one Anson Mark V, one twin Beech 18, one Beech 17, one Grumman Widgeon, one Travelair A6000A, one Junkers W33, one Junkers W34, two Republic Seabees, one Fairchild 82, two Fairchild 71s, five de Havilland Beaver C-2s, four Noorduyn Norseman Mark Vs and two Norseman Mark VIs. The Seabees are up for sale.

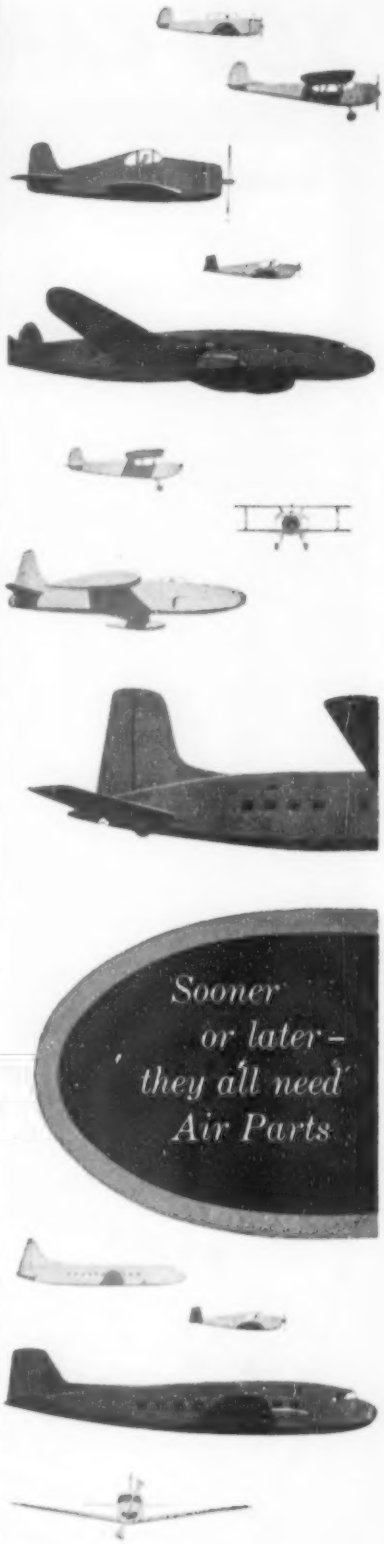
Laidman commented that the Beaver is an excellent plane for getting in and out of high, short lakes, but cabin size limits cargo.

▶ **Current Operations**—PWA's main run is from Vancouver to Kemano and Kitimat with a flag stop at Kildala. Flights operate daily except Sunday, twice on Friday. Canso, Beaver and Norseman equipment is used. A Grumman Widgeon operates nine times a week between the Three Ks and to Terrace where connections are made with Canadian Pacific Airlines to Edmonton and east. An amphibian is essential for this operation because the Three Ks have only water landing facilities and Terrace has only a landing field.

PWA also operates daily between Vancouver and Bridge River. It flies daily to Gun Lake, center of big mining areas and near a large hydroelectric project; six times a week between Port Alberni and settlements on Barclay Sound, and numerous flights between Vancouver, the Gulf Islands and Jervis Inlet. And it maintains 10 charter bases scattered throughout British Columbia to serve mining, logging and fishing interests.

▶ **Personalized Service**—Baker thinks that aside from sticking to the letter of his contracts and keeping his planes flying as exactly on schedule as weather permits some of his success is due to his emphasis on personalized service.

"We try to make our customers feel that the plane they charter from us is a piece of their own equipment." A flight from Vancouver to Terrace, via Alert Bay, Kemano, Kildala, and Kitimat in PWA's Grumman Widgeon convinced this reporter of the sincerity of Baker's statement.



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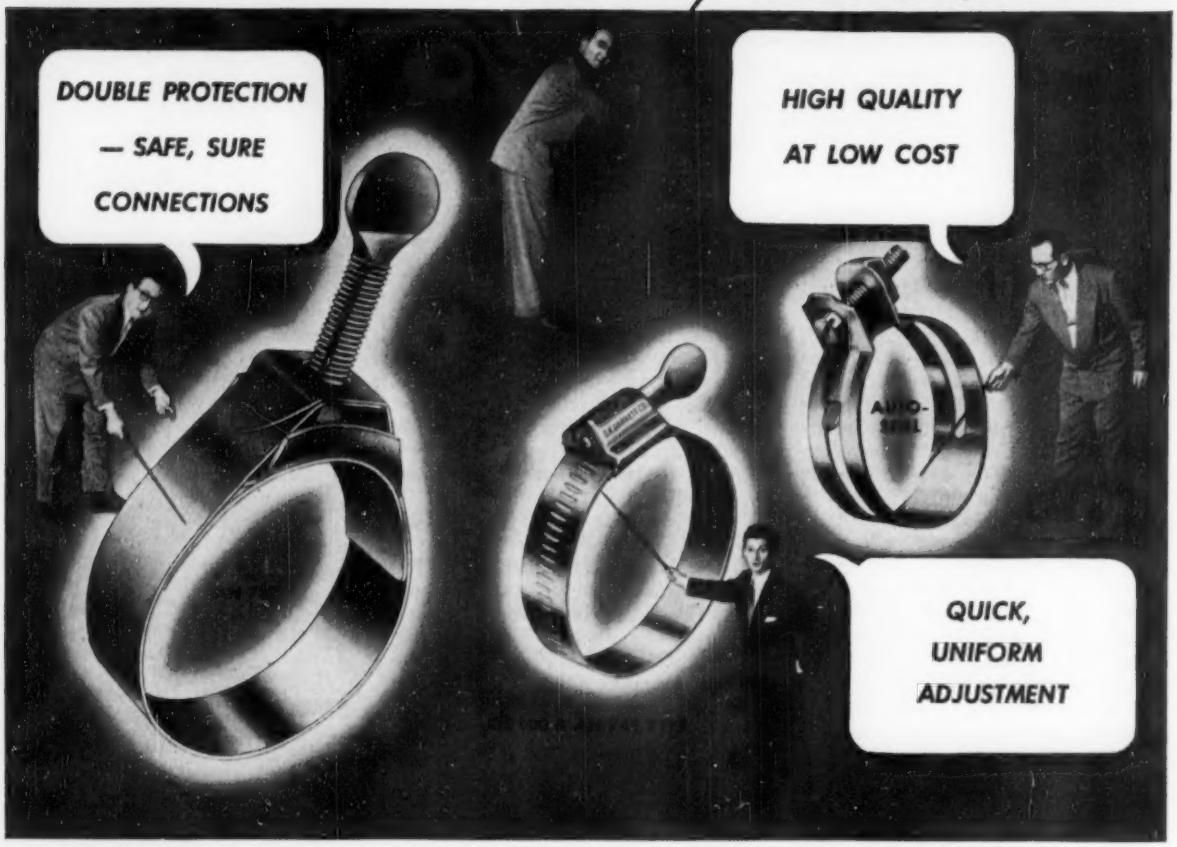

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QS 100 & AN 748 TYPE—Worm type, self-locking screw assures uniform, instant adjustment. Plated to prevent corrosion. Used and approved by the Armed Forces.

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Airlines Increase Cut-Rate Services

(Domestic trunklines)

Low-fare shares* of	1949	1950	1951	1952
Passenger-miles flown	11%	22%	21%	27%
Passenger revenues	8	17	17	21
Revenue breakdown: (in millions)				
Total revenue	$378	$430	$570	$671
Family plan	22	29	38	41
Aircoach	10	43	57	98

* Ratio of reduced fare revenues to total revenues is lower than ratio of reduced-fare mileage to total mileage because of lower unit yield per mile (4.25 cents on coach and family fare, compared with 6.01 cents for standard first-class service in 1952).

SOURCE: Air Transport Assn.

Aircoach Business Development

(Domestic trunklines)

	1949	1950	1951	1952	First half 1953
Passengers (Millions)	0.4	1.2	1.5	2.4	1.6
Passenger-miles (Billions)	0.2	1.1	1.3	2.3	1.7
Load factor	71%	74%	74%	76%	75%
Average trip length	705 mi.	847 mi.	837 mi.	964 mi.	1,016 mi.
Fare per mile	3.96 cents	4.10 cents	4.46 cents	4.18 cents	4.12 cents

SOURCE: Air Transport Assn.

Low-Fare Air Travel Increases

By Lee Moore

Cut-rate fares will produce one-third of all trunk airline passenger volume this year, an Air Transport Assn. economic report shows.

This compares with only 11% produced by reduced fares in 1949, first year the certificated airlines moved in on the mass travel market.

ATA estimates that domestic trunk airlines now do twice the aircoach business of the non-certificated lines.

Highlights of the report:

• **Reduced-fare** passenger-miles of trunklines will "rise well above the 4-billion mark" this year.

• **Aircoach** is the most dynamic factor in present airline business expansion, climbing from 3% of total passenger revenues in 1949 to 20% this year.

• **Coach load factor**—best index of profit per flight—gained from 71% in 1949 to 75% this year, despite six-fold expansion of capacity.

• **Family-fare** service (mid-week discount on first-class flights) has grown no faster than first-class service, remaining at 6-7% of total passenger revenues.

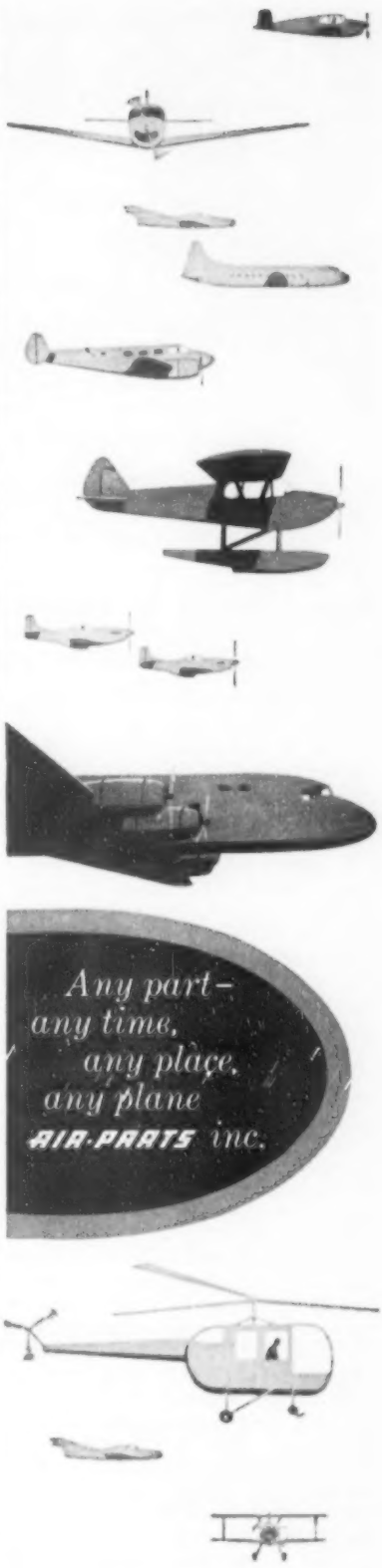
• **Average trip length** on reduced-rate services is about 1,000 mi., compared with 500 mi. on first-class service. Average coach-flight distance has increased from 705 to 1,016 mi. However, the trip-length figures are difficult to interpret. (Almost all shorthaul services are at first-class rates, because the cost is higher regardless of seating density; also, when coach flights started, few connecting coach lines were available, so coach trips were shorter.)

▶ **Reasonable Fares**—ATA's Economics Division compiled this analysis from individual carriers' reports to Civil Aeronautics Board. Timing of the study coincides with CAB's reactivation of its General Fare Investigation as a "staff study."

Airlines generally believe their fares are "about right," ATA officials say. These tariffs have evolved through experiment, and profit margins and return on investment are considered reasonable.

CAB staff may recommend some minor adjustments in fare relationships on completion of its detailed study, but no major changes are expected unless general business conditions also change.

▶ **Aircoach Growth**—The ATA report shows the trend of aircoach growth is not flattening out. It implies that reduced-rate, longhaul services will produce half of all passenger traffic within a few years. Coach already dominates some high-density, longhaul routes.



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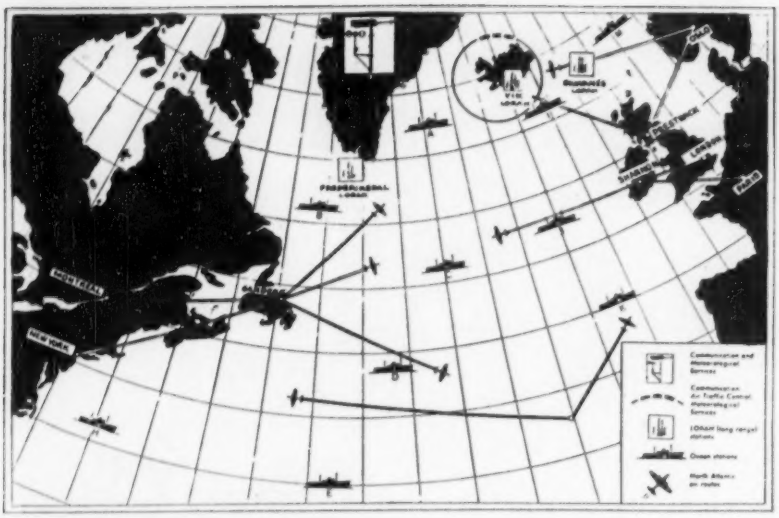

PRESENT PATTERN of North Atlantic weather ships, communications, navigation links.

Spotlight Is on Transport Ditching

Possibility of ICAO withdrawal of Atlantic weather ships turns airline attention to crash survival.

Loss of U.S. support for Atlantic weather ship stations has focussed more airline interest on the problem of ditching a transport on the high seas with no air-sea-rescue facility nearby.

A report on ditching technique by Coast Guard Lt. Cmdr. John M. Waters is receiving sharp attention because of the possibility that International Civil Aviation Organization may stop operating the Atlantic stations after the U.S. withdraws its $17-million support June 30 (AVIATION WEEK Nov. 2, p. 15).

But strong reliance of Britain France and Sweden on weather service from the stations indicates that some of the 10 will continue to operate.

The three nations told a special ICAO conference that the ships' weather reports are important to preflight and inflight operations.

▶**No Safety Problem**—However, International Air Transport Assn. has issued a policy statement that "withdrawal of these vessels will not in any way affect the safety of North Atlantic operations."

IATA says weather information is a responsibility of governments, and that the airlines plan to stay out of the weather ship controversy now brewing among some Atlantic powers.

▶**Chief Motive**—IATA noted that although ICAO has maintained the ships, beneficiaries other than aviation include general public in coastal areas, agriculture, military forces and merchant marine.

Because weather moves from west to east, Europe benefits from these services more than North America.

This is believed to be the chief motive of the U.S. in withdrawing its 50% share of financial and operational support for the weather stations.

▶**Fewer Ditchings**—All three nations asking retention of at least some Atlantic stations stressed weather reporting only.

Other major functions of the craft are air-sea-rescue, navigation aid and communications relay. But these apparently have become progressively less important over the years, and no trans-Atlantic land-based airliner has ditched near one since World War II.

Cmdr. Waters Report

Lt. Cmdr. John M. Waters recently told the Flight Safety Foundation that "many pilots consider a night ditching to be a rather hopeless situation, but with proper procedures it is far from hopeless."

Waters, who has analyzed hundreds of Coast Guard seaplane landings and landplane ditchings reports:

"In a controlled ditching, even under very adverse conditions, the probability is that no one will be seriously injured on impact."

"Some may be lost evacuating . . . if panic is allowed to develop or the crew is not properly indoctrinated in evacuation procedures, but even this loss can be cut down with proper training. Once evacuation . . . is accomplished, and with proper use of survival gear, rescue is virtually assured."

▶**Technique**—Here are Coast Guard findings on night and instrument ditching technique presented by Waters:

- **Position report** should admit any doubt as to accuracy. Bearings would be taken from distress transmissions.
- **Sea condition** is the key to any particular ditching situation. "In most cases, the swell system, not the wind, is the governing factor," Waters says.
- **Proper heading** "may well be the difference between a smooth, easy ditching and a disastrous crash."
- **Sea condition forecast** is available by normal or emergency radio request to air traffic control center, which gets it from rescue coordination center. With this information, a successful instrument letdown and landing without illumination is possible, as proved by a recent C-54 ditching 300 mi. off the California coast.
- **Flare drops** by pilot for sea evaluation are desirable when time, airworthiness and altitude permit.
- **Flare-lit landing** technique recommended: Take heading 90 deg. left of desired ditch heading, altitude 2,100 ft., and go over check list. Drop flare and start descent at 1,500 fpm., turning 90 deg. left after 10 sec. Hold downleg heading 30 sec., continuing descent. Then turn 180 deg. left, slowing rate of descent to 500 fpm. Now the plane should be at 200-300 ft. with flare 40 sec. ahead, well set up for quick normal landing. Pilot must land before reaching flare, fight tendency to hold off too long. Use of landing lights is not recommended: They may produce a glare.

Defense, Commerce Reorganize ANDB

Reorganization of Air Navigation Development Board was under way last week as a joint project of Defense and Commerce Departments.

The Administration's aim is to strengthen the interagency board's powers to join civil and military air traffic requirements of a non-tactical nature into a "common system" of air navigation and traffic control. Key men in the reorganization planning are Assistant Secretary of Defense Donald Quarles and Commerce Undersecretary Robert Murray.

Chief changes proposed:

- **Higher-level responsibility.** Present working-level board membership would be replaced by top-level officials of the four member agencies—Commerce, Air Force, Navy and Army.
- **Stronger budget position.** Each agency would apply separately for funds to support its projects in the coordinated program. The ANDB budget request presently appears as part of the Commerce Department budget, which has

tended to obscure its military importance. This has made the program vulnerable to heavy congressional cuts.

Some civil aviation groups fear that the proposed reorganization might cause military domination of ANDB, forcing civil aviation eventually to use primarily military systems.

Undersecretary Murray said the aim of the Commerce and Defense Departments is to improve the efficiency and power of ANDB and thereby indirectly enhance the civilian position.

CAB ORDERS

(Oct. 26th–Nov. 1)

GRANTED:

U. S. Defense and Agriculture Departments permission to intervene in airfreight rate case.

Wien Alaska Airlines subsidy mail rate of $1,360,583 a year from last July. As proposed in CAB show-cause order, this should yield $51,802 profit on allowable investment. Back pay proposed is $951,152 for Oct. 24, 1952-June 30, 1953.

Cockett Airlines and Andrew Flying Service, both air taxi operators of Hawaii, exemption to fly 10 trips a month on routes served by certificated carriers, Hawaiian and Trans-Pacific Airlines. They may serve noncompetitive routes without restriction.

Southern Airways permission to omit service at Gulfport-Biloxi, Miss., on Segment 4, Route No. 98, on one scheduled flight daily.

Central Airlines permission to serve between Meacham Field and Amon Carter Field, Tex., until Central's maintenance base is moved from Meacham. . . . permission to omit service to Chickasha, Okla., during darkness—until adequate lighting facilities are installed.

North Central Airlines service to Manitowoc, Wisc.

Trans-Texas Airways certificate amendment to include service to Coleman, Tex., between San Angelo and Brownwood, Tex.; CAB found no need for service to Roswell, N. M.

Cuba Aeropostal foreign air carrier permit to serve Havana-Miami route. Company agreed to cease and desist from certain unauthorized cargo operations.

Bonanza Air Lines route renewal case intervention by cities of Reno and Hawthorne, Nev., San Jose and Inyokern, Calif.

APPROVED:

Interlocking relationship of William Littlewood as American Airlines vice president-engineering and as director of Cornell Aeronautical Laboratory.

Interlocking relationship of Claude E. Peterson as a director of Railway Express Agency and vice president of Southern Pacific Co. and the Texas & New Orleans Railroad Co.

DISMISSED:

Linea Aeropostal Venezolana investigation as moot, following effectiveness of the civil air transport agreement between U. S. and Venezuela.

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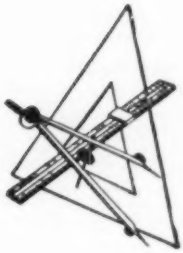

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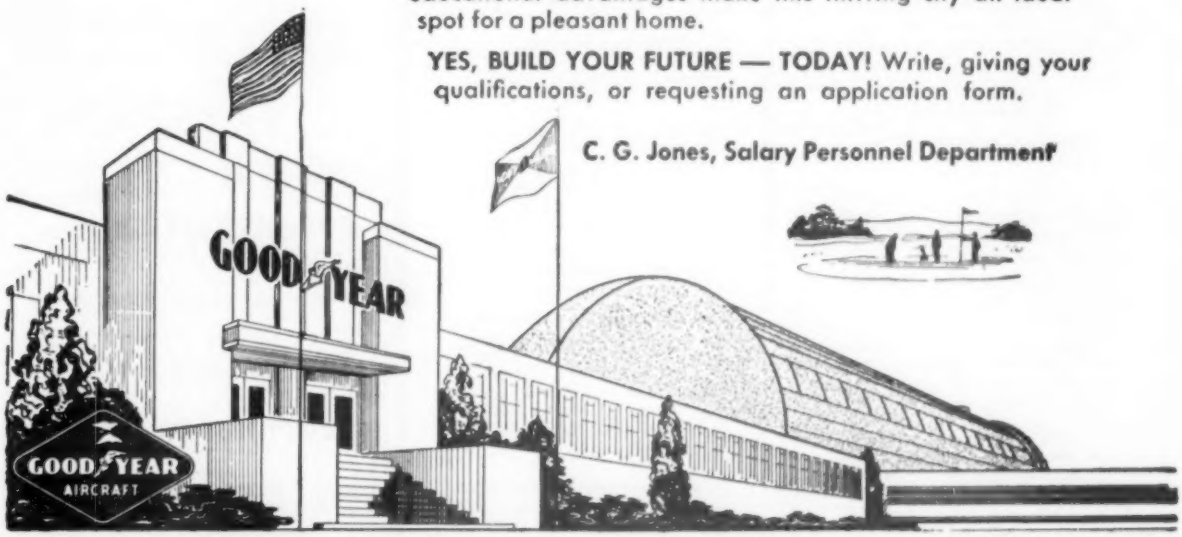

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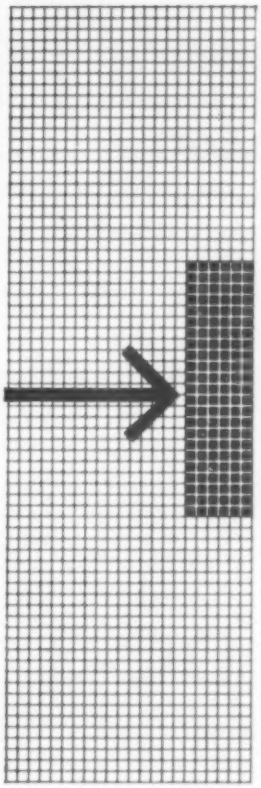

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AIRCRAFT ACCESSORIES

Description	Mfg.	Part No.	Quan.
Heater	Surface Combustion Co.	83A9	6
Heater	Stewart Warner (200,000 BTU)	921B	230
Blower	Dynamic Air Engine	4582-AA-6C	18
Blower	Joy Manufacturing Co.	U-702-15	24
Tank Unit	Minn. Honeywell	G-1098D	11
Trim Tab Controller	Pioneer	#15701-R	20
Oil Cooler Assembly	U.A.P.	U8416-MM	12
Oil Cooler Assembly	U.A.P.	U8013-MM	14
Hydraulic Pump	Vickers	MF9-713-15H	120
Hydraulic Pump	Vickers	PF12-713-25BCE	124
Hydraulic Pump	Vickers	PF4-713-20BCE	327
Hydraulic Pump/3000 P.S.I.	Vickers	MF45-3911-20Z	43
Hydraulic Cylinder	Air Associates	HC2109	29
Hydraulic Cylinder	Air Associates	HC2110	8
Fire Detector	Edison	117-47	46
Fire Detector	CO_2 Mfg. Co.	ASDC2	65
CO_2 Cylinders	Kidde	981280	185
CO_2 Cylinders	Kidde	M870036B	47
Anti-Icer Pump	Adel	D7818	125
Auxiliary Power Unit	Eclipse	NEP-2	29
Auxiliary Power Unit	Lawrence	LER-30D	16
Pump	Pesco	1EAR-280BH	15
Pump	Pesco	1E-621	8
Pump	Pesco	2E258SA	21
Separator	Pesco	3V-217-HC	32
Accumulator	Vickers	AA14002A	35
Actuator	Air Associates	M-2031	22
Wobble Pump (D-3)	Erie Meter	AN4014	17
Oxygen Cyl.	Kidde	923748	74
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Starter	Eclipse	1416-12E	75
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Starter Motor	Jack & Heinz	JH950-R	90
Generator	G.E.	2CM46A2	4
Generator	Eclipse	1003-4	71
Carburetor	Stromberg	PD12K10	550
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Carburetor	Holley	1685-HAR	90
Carburetor	Holley	1375-F	19
Magneto	Scintilla	SF9-LN-2	407
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Oil Separator	Eclipse	564-2A	384
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Tachometer	Eclipse	2227-11-D3A	11
Vacuum Pump	Eclipse	610-2C	6
Spark Plugs	Aero	LS4-AD1	185,000

AIRCRAFT ENGINES & PARTS

Engine	Wright	R-1820-52	1
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Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

AIRCRAFT ENGINES & PARTS (Cont.)

Description	Mfg.	Part No.	Quan.
Q.E.C. Unit		PY4M(B24)	17
Bearing	Torrington	NR6L12	25790
Bearing	Fafnir	AN200-K3L2	18273

GAUGES

Compass	Eclipse	36001-0	20
Gyro Indicator	Eclipse	14601-1F-B1	11
Gyro Indicator	Eclipse	10078-1AG	62
Position Indicator, Wheel & Flap	Weston	AN5780-2	400
Position Indicator, Wheel & Flap	G.E.	AN5780-2	1000
Position Indicator, Wheel & Flap	Eclipse	20100-11C-4-A1	23
Pitch Trim Gauge	Eclipse	15100-1B-A1	19
Cowl Flap Indicator	G.E.	8DJ29AAY	21
Oil Temp. Indicator	Lewis	77C3	23
Oil Temp. Indicator	Lewis	77C4	13
Oil Temp. Indicator	Weston	828TY13Z2	71
Manifold Pressure Gauge	Manning, Maxwell & Moore	AN5770-2	28
Manifold Pressure Gauge	U.S. Gauge (Metric)	AW2-3/4-25K	146
Fuel Quantity Gauge	Eclipse	3801-3B	128
Dual Carb. Temp. Gauge	Weston	828TY12Z2	40
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Carb. Air Temp.	Weston	119862	40
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Air Temp. Gauge	Weston	727TY72Z2	85
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Air Temp. Gauge	Lewis	47B22	33
Air Temp. Gauge	Lewis	47B23	28
Air Temp. Gauge	Lewis	47B24	54
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Cylinder Head Temp.	Lewis	76B19	8
Torque Indicator	Eclipse	20100-42B-14A2	9
Tachometer Indicator	G.E.	8DJ13ABK	6
Tachometer Indicator	Eclipse	2222-1F-2A	200
Magnesyn Pos. Indicator	Eclipse	20000-8A-14	9
Magnesyn Transmitter	Eclipse	20000-43A-13A1	8
Magnesyn Indicator	Eclipse	23000-2A	67
Pressure Transmitter	Eclipse	22101-11-A4	15
Pressure Transmitter	Giannini	47114-D2.0-20	8
Differential Pressure Gauge	Kollsman	906-6-011	22
Differential Pressure Gauge	Kollsman	254BK-6-052	48

AIRCRAFT (RADIO)

Transmitter	Bendix Radio	TA-12B	20
Receiver	Bendix Radio	RA10-DB	35
Amplifier (PB10) W/ED2 Mount	Eclipse	15401-1	10
Amplifier	Eclipse	12086-1C	11
Radio Noise Filter	G.E.	1C-200	740
Radio Noise Filter	G.E.	NF10084	959
Tube		JAN6AL5	327
Standing Wave Ind.	Hewlett Packard	415A	3
Antenna Switch	Bendix Radio	MS49A	26
Control	Bendix Radio	3616	81
Station Box	Bendix Radio	3620	23
Insulator	Bendix Radio	MT48C	518

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Transformer	Eclipse	DW33	11
Transformer	Eclipse	DW28	80
Transformer	Eclipse	DW47	33
Transformer	G.E.	70G3	26
Servo Motor	Transicoil	#1300-20	57
Motor	G.E.	5BA40NJ1A	425
Motor	G.E.	5DP65-MB1	189
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Motor	Diehl	FD65-5	21
Circuit Breaker	Spencer	PM-5	2094

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Circuit Breaker	Spencer	C6363-1-5A	115
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Circuit Breaker	Heinemann	AM1614-80	1700
Circuit Breaker	Cutler Hammer	6141-H69A	237
Amplidyne	G.E.	5AM31JJ9A	31
Amplidyne	G.E.	5AM31NJ10	111
Switch	Kidde	A-4614	151
Ignition Switch	Scintilla	AN3213-1	70
Ignition Switch	Nesco	A-9(94-3226)	250
Master Switch	Jos Pollack	M862A	65
Thermo Switch	Fenwall	17322-2	196
Heater Control Switch	White-Rodgers	1033-4E1	287
Air Ram Switch	Minn. Honeywell	PG208A51	148
Air Ram Switch	Minn. Honeywell	PG208AS7	40
Pressure Switch	Aerotec	M-101-B	20
Pressure Switch	Eclipse	3135-11C	88
Impact Switch	Kidde	SA/3A	18
Switch	C.H.	8909-K99	2000
Dome Light	Grimes	AN3096-4	2585
Dome Light	Grimes	AN3096-5	775
Dome Light	Grimes	AN3096-6	1365
Plug	Cannon	NAF310310-4B	2747
Plug	Cannon	NAF310310-5B	402
Relay	Leach	7264-404	47
Relay	Leach	7210	24
Relay	Allied	BOBX-2	31
Relay	Square D	82A	718
Relay	G.E.	CR2791-G100-K4	281
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Relay	Guardian	G34464	41
Relay	Guardian	G31502-A	350
Relay	C. P. Clare	D2060	45
Control Box	Vapor Car Heating Co.	9804B	34
Compensator	Vapor Car Heating Co.	46B311	25
Solenoid	Interstate Aircraft & Eng. Co.	A812	202
Flex. Cable	Airesearch	25432	66
Temp. Control	Fulton Syphon	715E	52
Noise Filter	Mallory	NF3-5	500
Regulator	G.E.	3GBD1A18A	13

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Valve	Kidde	982585	326
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Valve	Oh. Chem.	AN60009-2A	247
Valve (3000 PSI)	Parker	2-1046-76	47
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Solenoid Valve	United	37D6210 (AN4078-1)	2200
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Throttling Valve		73-A-01	1865
Relief Valve	Airex	1265-900	240
Pressure Relief Valve	Aerotec	V301B7	20
Valve	Aero Supply	74247 (TyPH3)	814
Valve	Whittaker	AN5830-1	335
Valve	Whittaker	AN5830-6	74
Valve	Parker	AN5831-1	60
Valve	Eclipse	612-4A	130
Valve	Kohler	K1593-6D	1888
Valve (0-500PSI)	Bendix	146102	46

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White for Darkness

Latest fad on several airlines is the marking of instruments with white mat paint instead of the traditional phosphorescent or luminous paint. Reasons given for this change include a state law and economics.

Instruments heretofore always have been coated with luminous paint to increase readability under conditions of dim cockpit lighting, which in turn is necessary for better visibility through the windshield.

Obviously, more cockpit light now will be needed and visibility outside the plane will suffer. This is interesting. There has been quite a stir lately about pilots keeping a sharper lookout for traffic. And more cockpit light is a mighty strange way to go about this.

►**Cockpit Hazard**—More important, however, is the stir created in the cockpit when the pilot looks down and doesn't see the required gage. And then there is the electrical fire hazard. Proper action when this fire threatens is a prompt and accurately aimed blow at the master electrical and battery switches. The resulting blackout also eliminates the light source for non-luminous instruments.

►**The Reasons**—It seems that one of the major airlines has its instrument overhaul base in California. A health law there prohibits use of luminous paint because of its poisonous characteristics. Artists used to nibbling the end of their paintbrushes will fare better under the new color scheme.

It also has been found that white mat paint produces a cheaper instrument—a statement that can be taken in various ways. As to whether the few dollars saved in this fashion constitute smart economy on million-dollar airplanes is open to question. All pilots heard from so far vote a strong "No."

Ping-Pong in Aviation

The bulletin board of Allegheny Airlines (formerly All-American) in a Washington hangar corridor includes the usual items of local interest, load factors, employes in military service, births, marriages, etc. But it also includes a notice with this message: "Those interested in a ping-pong tournament sign here."

This, of course, is hardly an item calculated to revolutionize aviation. The signers were the usual names one would expect to see, except one. Halfway down, inconspicuously mixed with the others was written, "Les Barnes."

Whether Les is a good ping-pong player or not we don't know—yet. On the other hand it probably doesn't matter. In case you just tuned in, Les helps run the outfit—he's the president.

►**"A Good Egg"**—Usually, you know, this rank is somewhat above the file. It's all very well for a president to have publicity shots taken and to attend company banquets and the like, but to get in there and mix isn't done. Just to check on things, a little snooping and questioning brought the general response from Allegheny employes that this guy Barnes is a good egg and they are with him.

Perhaps this is the way little businesses grow to be big ones. Maybe it also is the reason why big corporations sometimes find the little ones doing a better job and pushing up. At any rate many companies—and not just airlines by any means—could stand more of this spirit of working together from both ends of the scale. Who knows, this ping-pong game may be the start of another major airline.

(Editor's note: Aviation Week gives Capt. Robson an opportunity to express himself freely in this column. Comments from readers on his opinions are welcome.)

AVIATION CALENDAR

Nov. 10—Luncheon honoring Col. Bernt Balchen, Jacqueline Auriol and Walter L. Massic, 1953 winners of the Harmon International Trophies, Hotel Statler, Washington, D. C.

Nov. 16-17—American Society for Quality Control, conference of the Aircraft Technical Committee, Biltmore Hotel, Dayton, Ohio.

Nov. 17-20—Aviation Distributors and Manufacturers Assn., 11th annual meeting, Jefferson Hotel, St. Louis.

Nov. 19-21—Symposium on Airpower, sponsored by Dallas Council on World Affairs, Baker Hotel, Dallas.

Nov. 19-21—National Aviation Trades Assn. 14th annual convention, Hotel Broadview, Wichita.

Nov. 23-24—Operations Research Society of America, fall national meeting, Statler Hotel, Boston.

Nov. 29-30—Society for Advancement of Management Conference, Hotel Statler, New York.

Nov. 30-Dec. 1—Fifth annual Air Cargo Day, ASME, Hotel Statler, New York.

Nov. 30-Dec. 2—American Society of Mechanical Engineers, annual meeting, Hotel Statler, New York.

Dec. 1-2—ASME's Frequency Response Symposium, Hotel Statler, New York.

Dec. 1-2—Second annual Heavy Press Program, ASME, covering helicopter transmission design features and turbojet components, Hotel Statler, New York. Luncheon honoring engineers' contribution to powered flight by ASME and IAS.

Dec. 17—Seventeenth Wright Brothers Lecture, U. S. Chamber of Commerce building, Washington, D. C. Aero Club Wright Day dinner, Hotel Statler.

Dec. 17—Royal Aero Club, dinner commemorating 50th anniversary of powered flight, Dorchester Hotel, London.

Jan. 10-12—Institute of Surplus Dealers, trade show and convention, Madison Square Garden, New York.

Jan. 18-22—American Institute of Electrical Engineers, winter meeting, Hotel Statler, New York.

Jan. 20-22—Operations Research in Production and Inventory Control, Case Institute of Technology, Cleveland. Speakers include Paul Stillson of Lockheed Aircraft Military Operations Research Division.

Jan. 25-28—Plant Maintenance & Engineering Show, International Amphitheater, Chicago. Conference will be held concurrently at the Hotel Conrad Hilton.

Feb. 3-5—Society of Plastics Industry, ninth annual division conference on reinforced plastics, Edgewater Beach Hotel, Chicago.

Mar. 22-25—Institute of Radio Engineers, national convention, Waldorf Astoria Hotel and Kingsbridge Armory, New York.

Apr. 5-6—Society of the Plastics Industry (Canada), Inc., 12th annual conference, Mount Royal Hotel, Montreal.

Apr. 29-30—American Society of Tool Engineers, 10th biennial industrial exposition, Convention Center, Philadelphia.

May 5-7—Third International Aviation Trade Show, sponsored by Aircraft Trade Shows, Inc., 71st Regiment Armory, New York.

May 12-14—Engineering Institute of Canada, annual meeting, Quebec.

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EDITORIAL

Spoon-Feeding the Public

If we are to believe press reports quoting the Far East Air Forces, "a great deal of valuable information" was extracted from our flight tests of that Russian-built MiG that was flown over the lines to the United Nations base near Seoul recently.

But it is to be hoped that the USAF learned far more than its spokesmen at Tokyo told assembled newspapermen. The accounts published here contained little information that our Air Force did not know already about the MiG. The data in the press dispatches served to lull the public in the belief that, as usual, we Americans have the best of everything, with nothing to fear from Russian aviation or production.

This kind of soothing syrup spoon-fed to the public is in sharp contrast with the sporadic warnings emitted in Washington from time to time by our top government officials, especially the ranking civilian Secretaries and officers of the Department of Defense and Air Force, on the subject of the Russian air menace.

If the USAF experts who examined and test-flew this ship found any feature that was superior to our own best aircraft, the cable dispatches that came to our attention skip it completely.

On the other hand, the FEAF officers said:

(1) The MiG is inferior to the F-86.

(2) The test pilots agreed they "preferred the Sabre," one pilot saying the MiG "is a light plane with a big engine."

(3) The MiG lacks automatic equipment and controls, so that the pilot is kept busy and has his attention diverted from alert flying. It has a lower maximum speed than the Sabre. There is insufficient stall warning and poor cockpit comfort. The heating and ventilating systems are poor. The cockpit is so small that a big man would have difficulty flying the plane.

The Air Force does neither itself nor the country any service in entering tests with a prejudiced viewpoint, or in withholding from the public the fact that they found any superior or thought-provoking ideas. Instead, they appear to be presenting for public consumption only points deemed to be the MiG's alleged inferiorities, based on our own standards.

It is impossible for anyone at all familiar with military aviation to believe that any careful, unprejudiced examination—even of the superficial type required under the international conditions prevailing in this case—would unearth no points of superiority. Why is the MiG's altitude capability unmentioned, for example? And why were we so anxious to pay $100,000 for a MiG if there weren't some questions we wanted answered?

As pointed out several weeks ago on this page, the U. S. government's offer to return this MiG to "the rightful owner" precluded many important flight and static tests which should have been made. We will be deprived of thorough-going analysis of manufacturing materials and methods, for example. But even superficial tests must have added in some way to our previous knowledge of Russian aeronautical thinking—not all of which we dare to believe is unsound and without a new idea.

Tremendous Shorthaul Market

Continuing development of the helicopter is spurring an important study by an Air Transport Assn. group into the possibilities for aviation in the tremendous common carriage shorthaul market.

Previously, airline authorities have held no hope of making any sizable dent in the shorthaul business, but the helicopter is rapidly changing this pessimism among top people to an attitude of "let's give it a look."

Preliminary studies will give an idea of the impact of intercity common-carrier traffic.

This year, one student of the subject tells Aviation Week, about 296,300,000 tickets will be sold by common carriers in this country for individual trips of less than 50 miles distance, of which the airlines will be fortunate to win 100,000.

In the next bracket, for trips of 51 to 100 miles, all common carriers—including bus, rail and air—will move about 92,100,000 persons. Of these, air transportation will get about 300,000.

In this latter mileage bracket ATA research people believe the helicopter will be "very much adaptable."

In other words, as one expert put it, "there sits a market of roughly 92 million passengers in 1953 of which we in aviation, with our present equipment, the way we operate, the way we handle passengers, and with our airports, will get the colossal total of 300,000."

In the mileage bracket of 101 to 250 miles, the size of the common carrier market this year is estimated at about 79 million, of which the airlines will get about 8,900,000.

For trips of 501 miles to 1,000, the aggregate passenger business for all common carriers this year will be about 13,700,000 persons, and the airlines probably will win 5,100,000 of them.

In the 1,001-1,500 mile bracket, the 1953 passenger market is estimated at 4,600,000, and the airlines probably will carry 3,200,000.

If aviation wants to say that we really are serving the people, the ATA researchers think perhaps we had better start trying to serve all of the people and not be content any longer with carrying only the longhaul passengers—who tote up some impressive passenger miles but represent comparatively few individual passengers.

Those of us with unbounded faith in aviation have not been surprised at the vast growth in aircoach, which now serves thousands of new customers. We have as much faith in the helicopter's eventual abilities to win millions of other passengers.

Much work must be done, in both technical development of the helicopter and in operations refinements, before any important segment of the shorthaul common carrier business goes into the air.

But the fact that our own airline trade association is beginning to give earnest thought to such market analysis is encouraging in the extreme.

—Robert H. Wood.

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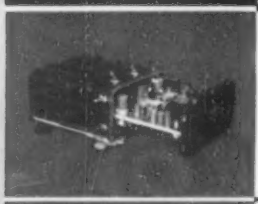
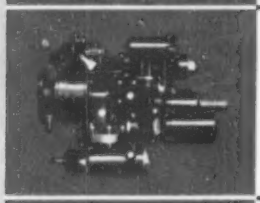
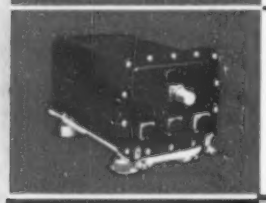


ELECTRONIC CONTROL Senses engine speeds, gas temperatures and other control factors — then signals fuel requirements to the fuel metering unit.



FUEL METERING UNIT Electrically controlled, this unit meters fuel to the engine in accord with signals from the electronic control.



ELECTRONIC AMPLIFIER Maintains a scheduled exhaust turbine temperature by controlling the nozzle area.

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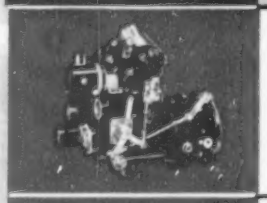

MAIN FUEL CONTROL The control illustrated includes a governor which holds the engine at a selected speed regardless of altitude.

AFTERBURNER FUEL CONTROL Graduates the afterburner thrust by selecting fuel flow in various proportions to mass air flow through the engine.

NOZZLE CONTROL A hydro-mechanical servo control unit which actuates the variable exhaust nozzle mechanism of a jet engine.

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